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Analyzing the Factors that Lead to Housing and Construction Cost Escalation: A Case Study Focused on Riyadh, Saudi Arabia

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ANALYZING THE FACTORS THAT LEAD TO HOUSING AND CONSTRUCTION COST ESCALATION: A CASE STUDY FOCUSED ON RIYADH, SAUDI ARABIA

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ANALYZING THE FACTORS THAT LEAD TO HOUSING AND CONSTRUCTION COST ESCALATION: A CASE STUDY FOCUSED ON RIYADH, SAUDI ARABIA

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4-16-13

Dean, Graduate Studies and Research Date

I dedicate this thesis to my parents who are a great inspiration to me. Also, I dedicate this thesis to my sisters, brothers, my wife, and my son.

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Riyadh city suffers from high housing and construction costs, which have increased by more than 200% over the last 7 years. This problem led to a significant interest from the government and the citizens of the city in understanding the causes of housing and construction cost escalation and the best strategies to address this problem in the short and long-terms, in order to find solutions for affordable housing.

In response to the absence of research regarding this problem, the researcher has decided to conduct a scientific survey about the factors that might have led to this problem in Riyadh. While conducting the literature review, the researcher identified 16 possible factors that were mentioned as possible causes for this problem. Thus, the main objective of this study is to identify the main factors that affect housing cost escalation.

All of the survey samples were collected from construction industry professionals and experts working in Riyadh. The sample size required was calculated using the statistical equation mentioned in Chapter 4, and based on an estimated level of confidence of 90%, standard error of 10%, and a standard deviation calculated from 30 random samples collected initially. The required sample size was estimated to be at least 215 surveys, and the researcher was able to collect a total of 237 surveys.

After collecting the data, the researcher analyzed the data through Microsoft Excel software by applying descriptive statistics, means, modes, and standard deviations. Tables and figures have been used to show the results of the survey. After analyzing the

data, the researcher identified the main factors based on the mode and mean averages. The researcher has identified four major impacting factors that affected housing and construction costs.

The most impacting factors on housing and construction cost are the corruption in selling land, speculative purchases of land, high demand for housing, and the high population growth rate in Riyadh. The main recommendations that should help the government to solve this problem are: to apply an annual tax on large plots, prevent speculative purchases in housing areas, monitor the prices of construction materials, and revive small cities around Riyadh to reduce congestion and crowding.

CHAPTER 1

INTRODUCTION

The dream of each Saudi citizen is to own his own house. However, economic problems began to arise in Saudi Arabia six years ago that have made this dream very difficult to achieve. These problems are complicated, so each specialist in the field of housing and construction holds a unique opinion regarding the main causes of the problems. The main obstacle that consumers face at present is the drastic increase in housing and construction prices in the mega cities of Saudi Arabia. The present study focuses specifically on housing and construction in Riyadh, Saudi Arabia.

Saudi Arabia's main industry is the production of oil. Now that Saudi Arabia's mega cities of Riyadh, Jeddah and Dammam are receiving a great influx of residents, construction and housing has become the country's second largest field after the oil field. The growth of this field has come with a sudden rise in the prices of construction and housing, especially in Riyadh. This increase has been so problematic that "The prices of construction materials are the next crisis of the Saudi real estate market" (Alhwish, 2010). The causes of these high prices have yet to be investigated, and they could be numerous and intertwined. The primary objective of this thesis is to investigate the critical factors that led to a drastic increase in housing and construction prices in such a short time. In the past, on average, anyone who aspired to own a house in Riyadh needed more than ten years to complete the payments to own a house. For example, in 2006, a Saudi citizen could buy a house with 4305 square feet for about 155,000 USD, but the same house now costs at least 320,000 USD. This increase has surprised all citizens, because it has occurred over the course of a mere five years. The houses are much more

expensive because the construction workers, construction materials, land and other components of housing have become very expensive to hire/purchase. One of the many unfortunate knock-on effects of this increase is that many new houses are of abysmally poor quality. Some companies are offering cheaper prices, but they cannot afford to purchase decent materials or to hire skilled workers while relying on this marketing strategy.

One of the main problems of the construction and housing industry may be attributed to the influence of the country's main industry, oil. Badran (2012) observed, "Expectations of rising prices of building materials are in line with the rise of oil." As the oil price increases it creates more problems, and these problems, in turn, increase the construction and housing prices even more. Therefore, the relationship between high oil prices and problems in the housing and construction industry is positive (directly proportional). The crisis needs to be resolved soon, as it is making itself more complicated as time progresses. Moreover, these problems make it difficult for economists to apply any method for decreasing the prices. For example, the persistent immigration from small cities to the mega cities with the high population growth will only continue to intensify demand. Now that the problem is complicated and out of control, finding the solution can not be easy or quick. Taking more time to apply the right solution will allow the problem to get even more difficult, so accurate research is preferable to the slower process of blind trial and error in this situation.

1.1 Problem Statement

The aim of this study is to define and identify the causes of the increase in construction cost in Riyadh. In light of these findings, this thesis has recommended ways to keep the prices under control, which will, on return, increase the quality of future buildings (output). In addition, the study has offered ideas for making the construction processes more professional. Overall, the study aims to find out how to stabilize the housing market with the impacted factors.

The thesis has focused on evaluating the factors that are expected to impact the construction cost by gathering data from surveys with construction companies. The factors that the surveys have investigated are, 1) the increase in oil prices (Badran, 2012 and Alsafhan, 2011), 2) the large demand for construction materials and labor due to government projects for housing (thus far, the government has subsidized 500,000 houses) (Alhwish, 2010, Arabian business, 2012), 3) the high demand for development of public works projects, such as schools, hospitals, and infrastructure (Aljaliedy, 2011 and Albaqamy, 2012), 4) the high demand for housing and construction by Saudi citizens (Saudieconomicsurvey, 2012, Aljaliedy, 2011, and Arabian business, 2012), 5) the Low supply of housing (Saudieconomicsurvey, 2012), 6) A rapid rise in the rate of population growth (Arabian business, 2012), 7) the manipulation and monopoly of suppliers of cement, steel and other construction materials (Alhwish, 2010), 8) the lack of trained labor (Albaqamy, 2012), 9) the absence of the government in monitoring prices (Alhwish, 2010), 10) corruption in monitoring government projects, 11) the existence of a black market (Althunian, 2012), 12) the high inflation rate, 13) contractors who are taking projects beyond their capacity (Alfawzan, 2012), 14) the Speculative purchase of

undeveloped lands (Aleqtesadya, 2012), 15) corruption in selling undeveloped lands, and 16) the exportation of construction materials outside of Saudi Arabia (Alhwish,2010).

1.2 Purpose of the Study

Saudi Arabia suffers from deep problems that underlie housing and construction companies, so this thesis aspires to reveal the main hidden factors of these problems. One of the reasons is population growth. Specifically, the average age in Riyadh is a mere 18 years. Moreover, Saudi Arabia's population growth rate is 2.90 % (Central Department of Statistics and Information, 2012). Oil prices also seem to be an enormous factor, because a higher oil price will make everything else cost more, such as transportation of personnel, shipping of materials, manufacturing and so on. Another factor is the underlying economic problems, such as inflation. In addition, government projects, such as subsidized schools and hospitals that help to cover the high population growth, seem to be contributing to higher prices. Likewise, a greater number of projects for public works might be another factor. The aforementioned factors, among others, have led to a 200% increase in the prices of construction and materials in only three years. Ten to fifteen years ago, an individual who owned a house in Saudi Arabia was considered a member of the middle income class, but not even middle income class members can buy a house these days. A brief overview of the population in Riyadh revealed that most people do not have enough money to build a house because of the increase in construction costs. Moreover, the rental prices have also skyrocketed in the three mega cities. More and more people are turning to apartments when they find that they cannot acquire a house, thus increasing the demand for apartments and making the real estate prices worse all across the board. The researcher believes that real estate's problem can be fixed in a few

years, whereas the construction companies and housing's problems will take more time. A quick solution is needed now because the situation is currently out of control. Thus, the purpose of the study is to find accessible solutions to the issues mentioned above, because "Prices of construction materials are going into the unknown…and the citizens wonder about the role of the government" (Aljaliedy, 2011). Moreover, attempting to eliminate the problem without looking at its causes will only make it worse and will entail a disaster to the Saudi people, because staying in rental apartments is not acceptable socially on the long term. The Saudi government has tried to solve this issue without doing research. The government simply built 500,000 housing units for Saudi citizens, but this solution obviously costs a lot of money, and, even worse, contributes to the problem. The Saudi government needs to know the real factors and how to address them in order to rectify the problem. Also, the thesis has investigated the key factors that led to this escalation, how to decrease the construction prices, and how to support the Saudi government in solving the problem.

The rationale of the thesis is to find the main factors and reasons for the skyrocketing housing and construction prices. The methodology has utilized quantitative research, and the researcher used a survey to conduct interviews with construction companies. The survey asked experts from construction companies to evaluate a list of probable factors on a scale of 1 to 5. The researcher adapted a list from the literature review regarding the potential causes and effects of the increased prices. In addition, the experts themselves had the opportunity to report additional factors, if deemed necessary. This methodology is expected to reveal the main factors that led to the construction and housing problems.

1.3 Hypotheses

By examining the literature, the researcher has extracted the factors that could be behind the escalation of housing and construction prices. The analysis of these factors has been conducted using a survey. The following factors have been identified and the main hypothesis is that they all contribute to the escalation of costs.

1) Escalation of Oil Prices: The increase in world oil demand in the past ten years, nearly 50 percent increase, led to the escalation of oil prices.

2) High Demand for Housing and Construction: This category includes high demand from, a) Saudi citizens, b) government housing projects, c) government public projects.

3) Low Housing Supply: This category includes the increase of annual demand for housing units and the low supply of housing units.

4) Rapid Rise in Population Growth: This category includes the high growth rate of Saudi population with more than 3% in the past 10 years.

5) Shortage of Construction Resources: This category includes, a) manipulation and monopoly of the suppliers of cement, steel and other construction materials, b) lack of trained labor, c) black Market, d) export of construction materials outside of Saudi Arabia.

6) Speculative Purchase of Undeveloped Lands: This category includes corruption in the selling process of undeveloped lands.

7) High Inflation Rate: This category includes the continuous increase in construction materials regarding the inflation factor.

8) Other Factors, such as: the absence of government's role in monitoring prices, corruption in monitoring government projects, and contractors who take projects beyond their capacity.

1.4 Limitations

The factors that the researcher included in the survey come solely from the literature review, so the survey could be overlooking some other factors. However, these factors can be identified through surveying the experts. Also, this survey has solicited the opinion of a limited number of experts (companies, specialists and engineers), so it may not capture the opinion of all experts in Saudi Arabia.

1.5 Delimitations

The researcher relied on the literature review of the survey, assuming that the literature is up to date, and the present study is about the current situation in Riyadh, Saudi Arabia. In addition, the study is only about residential buildings (houses and apartments), which are the focus of the literature.

1.6 Assumptions

This study comes mainly from the information in the literature, which means that the researcher assumed that a literature review has revealed the reasons and factors of high housing prices. Also, people who have received the survey are assumed to be knowledgeable of the situation and would be unbiased in their opinion.

1.7 Research Organization

Chapter 2:

This chapter presents a literature review regarding the current situation of construction and housing market in Saudi Arabia. The literature review focuses on identifying the factors that contribute to construction cost escalation. Also, it includes a review of literature on inflation and its effect on cost escalation.

Chapter 3:

This chapter presents the methodology that has been utilized to analyze the data of the survey. It includes:

1) The methodology of identifying the factors.

2) How to identify the experts who could help complete the survey.

3) The appropriate methods to analyze the data.

Chapter 4:

This chapter presents the collected data and the responses received from the experts regarding the questions in the survey.

Chapter 5:

This chapter presents the analysis of the collected data. The data has been analyzed through appropriate methods to determine the importance and relative significance of the factors.

Chapter 6:

This chapter summarizes the thesis, shows the results of the analysis, and discusses the future research directions on this subject.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is focused on providing information gained from different sources and authors in order to gain insights regarding the housing and construction cost escalation in Saudi Arabia.

This literature review section focuses on providing information regarding the Gulf Cooperating Council (GCC) countries. The aim is to identify the importance of the position of Saudi Arabia in GCC. To do so, an overview of the GCC construction industry is provided along with PESTLE analysis of Saudi Arabia. Furthermore, Saudi Arabia's construction industry is compared to the rest of the GCC countries to identify the country that has the most potential growth. This comparison provides information regarding the construction cost in Saudi Arabia and the rest of GCC countries along with the level of profits earned by these countries.

In addition, certain factors were evaluated and analyzed to identify the key factors of cost escalations in housing and construction industry in Saudi Arabia. The factors that were analyzed include economic, geographic, demographic, social, and other environmental factors to provide accurate and reliable information regarding the cost escalations in Saudi Arabia's construction industry. In the end, some strategies are proposed to help Saudi Arabia's construction industry reduce its construction and housing costs.

2.2 Overview of the GCC Industry

With Saudi Arabia, United Arab Emirates, Qatar, Oman, Bahrain and Kuwait being a part of GCC, construction contracts worth USD 50 billion were awarded to contractors in the first quarter of 2011 (Deloitte, 2012a). The breakup of these contracts is shown in figure 1:

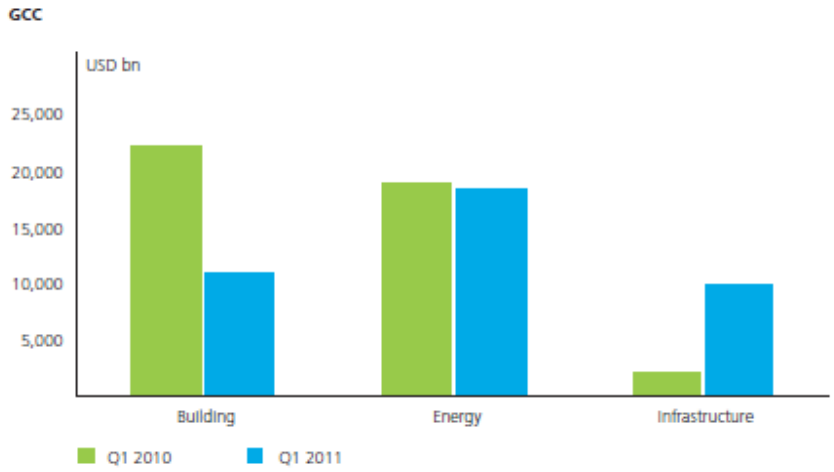

Figure 1. GCC Construction Contract Awards (data from Deloitte, 2012a)

The GCC flourished from the year 2003-2008 due to the spectacular increase in the oil prices. With an increase in oil prices, the cost of construction also increased to about 60 percent particularly in Dubai (Meed Cost Indices, 2012a). In order to stabilize the economy to create a more balanced state, several projects were initiated with construction being the major priority of GCC. The major hurdles for these projects were observed during the global economic crisis of 2008 where most of these initiated projects had to be cancelled or kept on hold. However, with the recovery of the economy it was predicted that the construction sector would be provided with outstanding growth opportunities in the forthcoming years (Meed Cost Indices, 2012a).

With the passage of time, the construction sector has shifted its focus from small and simple projects to more sophisticated and complex projects that require investments of billions of dollars. Such projects involve complex civil work, electromechanical systems and vital infrastructure to attract foreign and local investors. Construction companies rely on specialized and experienced sub-contractors to conduct these mega projects. Such projects have attracted many businessmen who are interested in investing in these projects. During the year 2006-2010, it was observed that UAE the percentage of construction sector in GDP increased from 8.9 percent to 11.5 percent in the year 2010 (Alpen Capital, 2012), this is reflected in figure 2:

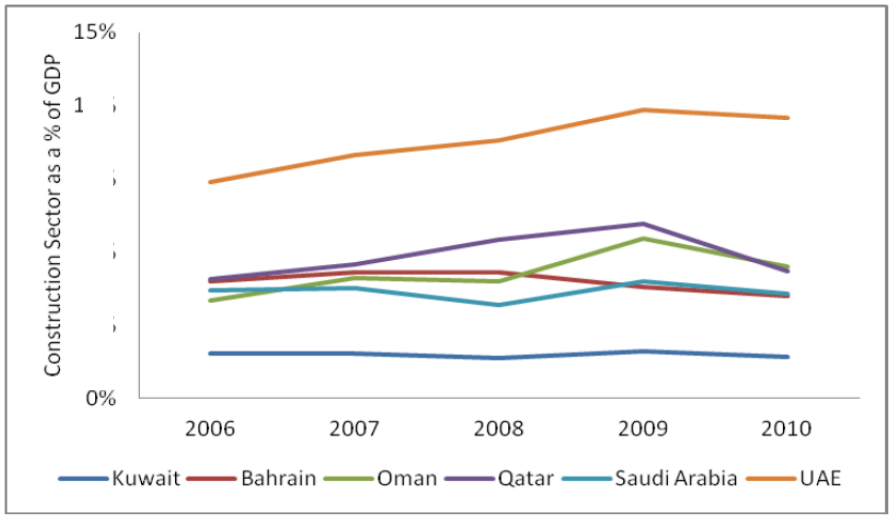

Figure 2. Construction Sector as % of GDP (data from Alpen Capital, 2012)

With the investment of USD 9 billion, UAE is now the second largest market of construction sector in GCC. On the other hand, Qatar has shown tremendous improvements on its economy. “Qatar has the fastest growing economy in GCC region with about 8 percent share of the total value of projects.” (USD 500 billion (Deloitte, 2012)).

In the year 2011, it was observed that complex construction projects were still top priority of GCC even after double-dip recession and challenging economic environment. The GCC was able to remain stable at USD 1.8 trillion (Alpen Capital, 2012). It is also worth mentioning that the construction and real estate projects occupied around 51.8 percent share in the overall value of the top 100 projects in the GCC region (Alpen Capital, 2012), as shown in figure 3:

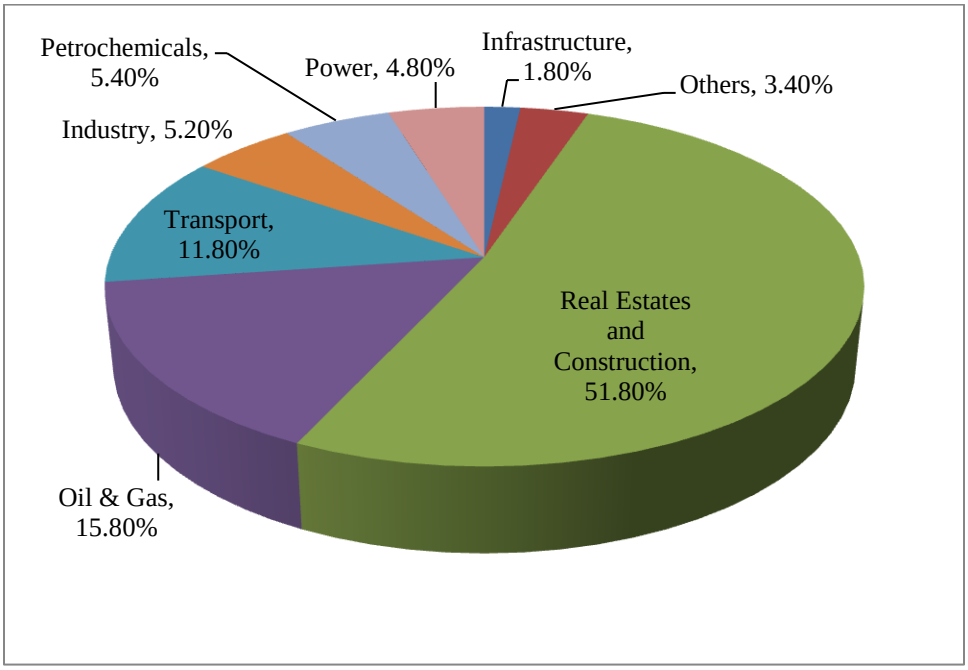

Figure 3. Top 100 Project Value: US $ 1,206 bn (data from Alpen Capital, 2012)

In 2011, UAE was ranked the highest country in with total worth of projects in USD 319.1 billion followed by Saudi Arabia with USD 218.9 billion (Alpen Capital, 2012), as shown in figure 4:

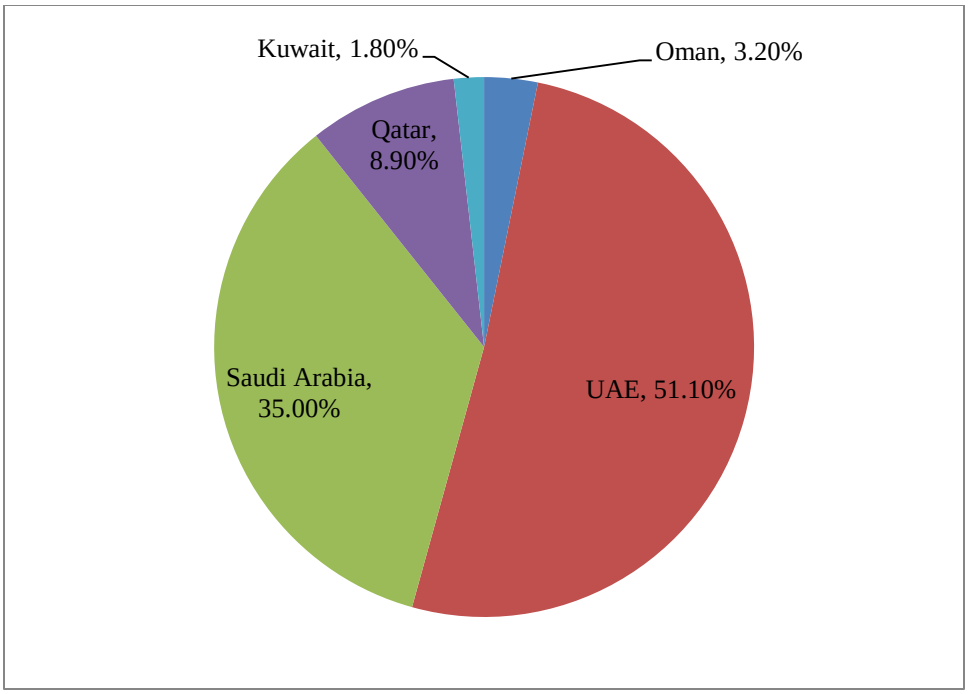

Figure 4. Top 100 Project Value: US $ 625 bn (data from Alpen Capital, 2012)

2.3 Overview of the Industry of Saudi Arabia

2.3.1. Overview of the industry

Saudi Arabia has the largest economy of GCC industry and has been taking the lead in investing in the construction sector followed by UAE. The construction sector in Saudi Arabia accounts for almost 8 percent of the GDP. The major construction activities are taking place in the cities of Riyadh, Jeddah and Dammam. These three major cities account for almost three-fourths (75) percent of construction activities in Saudi Arabia (Al-Nagadi, 2010).

2.3.2. PESTLE Analysis of Saudi Arabian industry

In order to gain insights regarding the Saudi Arabian industry, it is essential to conduct PESTLE analysis. PESTLE is an acronym for Political, Economic, Socio-cultural, Technological, Legal and Environmental. The PESTLE analysis of Saudi Arabian industry is as follows:

- Political

  The government's commitment is one of the most crucial factors that contributed to the success of Saudi Arabian construction industry. It was clear that during the economic crisis, the government of Saudi Arabia remained committed to supporting and enhancing the construction sector by providing the sector with investments of USD 80 billion. The aim behind such investments was to tune up the growth of the development and diversification programs in Saudi Arabia (Ventures, 2011).

- Economical

  The stabilized economy of Saudi Arabia is another major positive factor for Saudi Arabian construction industry. Lower inflation costs and raw material costs are some of the major elements for such stable economy. With the government's commitment and financial backing, the Saudi Arabian construction sector is sure to grow (Asad, 2012).

- Socio-cultural

  The Saudi Arabian construction industry embraces socio-cultural factors. This can be observed as younger workers are entering the construction business. The

growth in population is another factor as such population demands the construction industry to develop in the long-run (Ventures, 2011).

- Technological

  With latest technology available in Saudi Arabian construction industry, the growth of this particular sector is inevitable. With the availability of such technology, Saudi Arabia was able to attract several investors who are particularly interested in the growth of the construction industry in the forthcoming years (Ventures, 2011).

- Legal

  In order to promote the construction sector, laws and regulations at Saudi Arabia were simplified to enable businesses to start construction without any delay due to complex laws and regulations. The Saudi Arabian government also allowed businesses to open new businesses with 100 percent of foreign investment. Mortgage law has been made more lenient to boost the demand of residential segment along with home financing (Ventures, 2011).

- Environmental

  With an intention to take the environmental factor into consideration, the Saudi Arabian government is planning on spending about USD 39.9 billion on the construction of smart buildings that could promote long-term sustainability and reduce dioxide emission. Through the construction of such smart buildings, the Saudi Arabian government aims to reduce the amount of waste and the water usage (Ventures, 2011).

2.3.3. Market Size and shares

As per January 2011, the market size of Saudi Arabian construction industry based on budget total is reflected in figure 5:

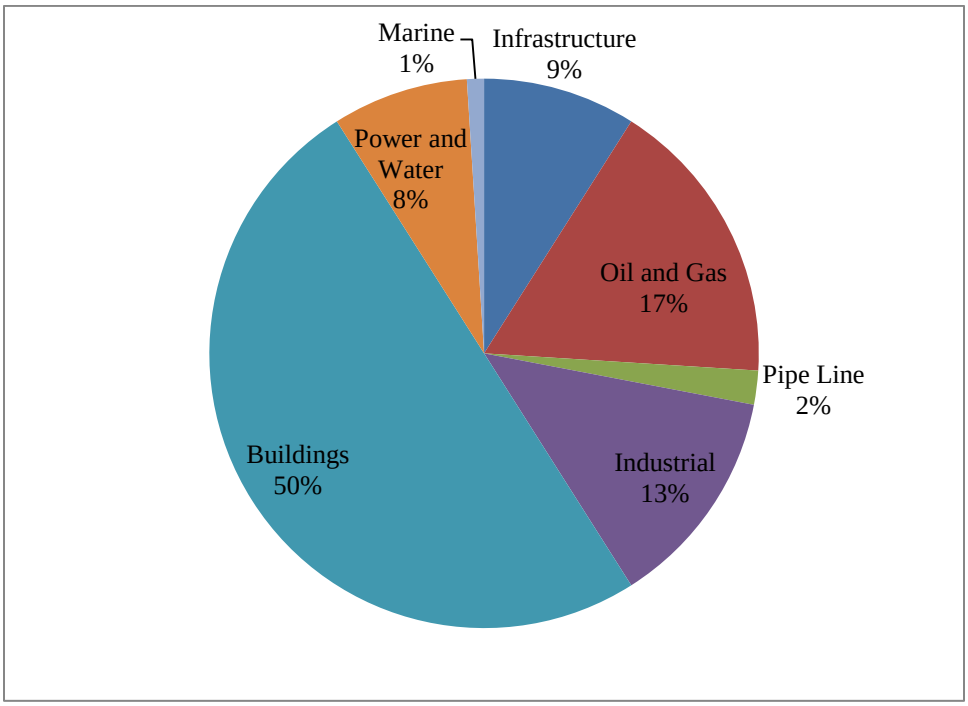

Figure 5. Saudi Construction Industry Budget Totals by Sector (US $ Million), January 2010, (data from Ventures, 2011)

It was observed that 50 percent of the total budget of Saudi Arabia was allocated to the construction sector. The budget allocation for oil and gas construction was only 17 percent followed by industrial construction with an allocation of 13 percent. It was also noted that the budget allocation for infrastructure; power and water, pipeline and marine had a single digit i.e. 9 percent, 8 percent, 2 percent and 1 percent respectively (Ventures, 2011).

Regarding the market share, it was observed that the market share was declined to a great extent from USD 110784 million in 2011 to USD 99546 million in 2012. It was also observed that the year 2011 was the most positive year for the Saudi Arabian construction industry in terms of market share. The market share continuously increased for about four consecutive years but somehow was declined in 2012 (Ventures, 2011), as reflected in figure 6:

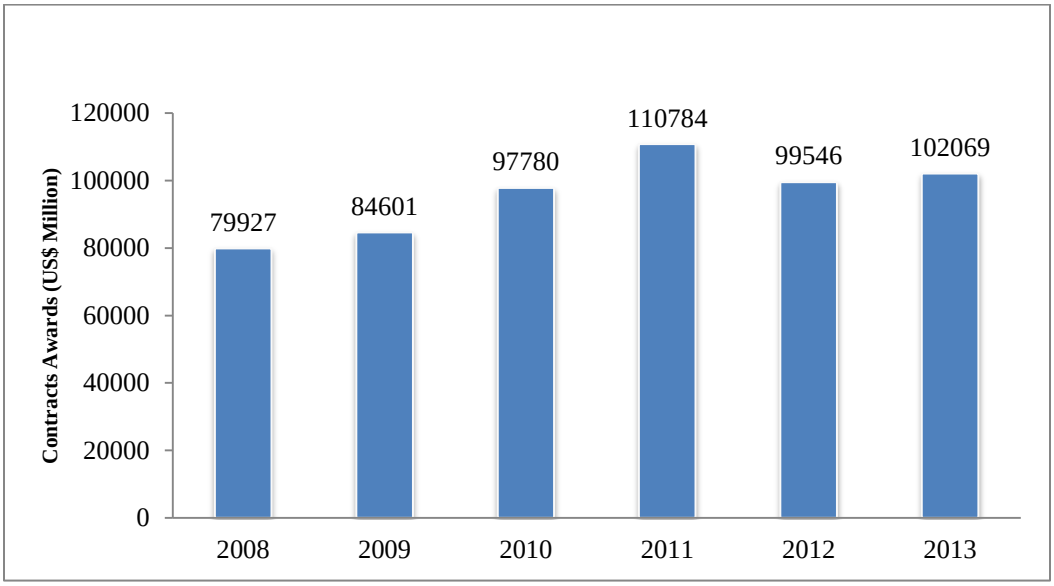

Figure 6. Total Contracts Awards Across Major Focus Sectors (US $ Million) (data from Ventures, 2011)

2.3.4. Market Forecasts

It has been forecasted that Saudi Arabian construction sector, being the major industry, will be awarded with about USD 102,069 million worth contracts for the growth of this particular sector. (Ventures, 2011)

It has been also forecasted that the oil and gas construction sector will receive around USD 15.4 million worth awards in the year 2013; being the last year for the

completion of construction projects, the market size will be reduced from 17.5 million in 2012 to 15.4 million in 2013 (Ventures, 2011), as shown in figure 7:

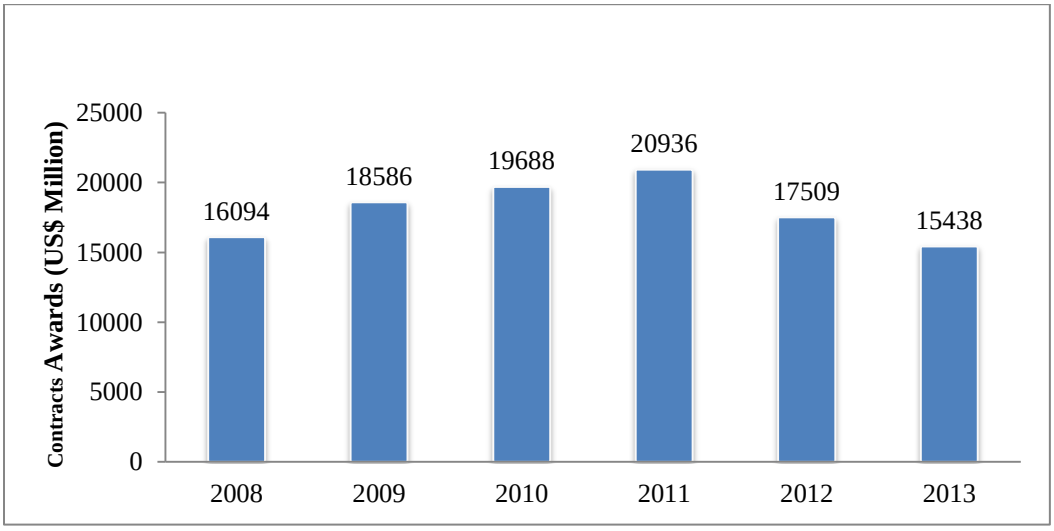

Figure 7. Oil & Gas Construction Contract Awards (US $ Million), 2008-2013 (data from Ventures, 2011)

Regarding the market size and forecast for Saudi Arabian power and water desalination construction, it has been forecasted that this particular construction sector will receive an increase in contract awards from USD 15.09 million in 2012 to USD 16.3 million in 2013 (Ventures, 2011), as shown in figure 8:

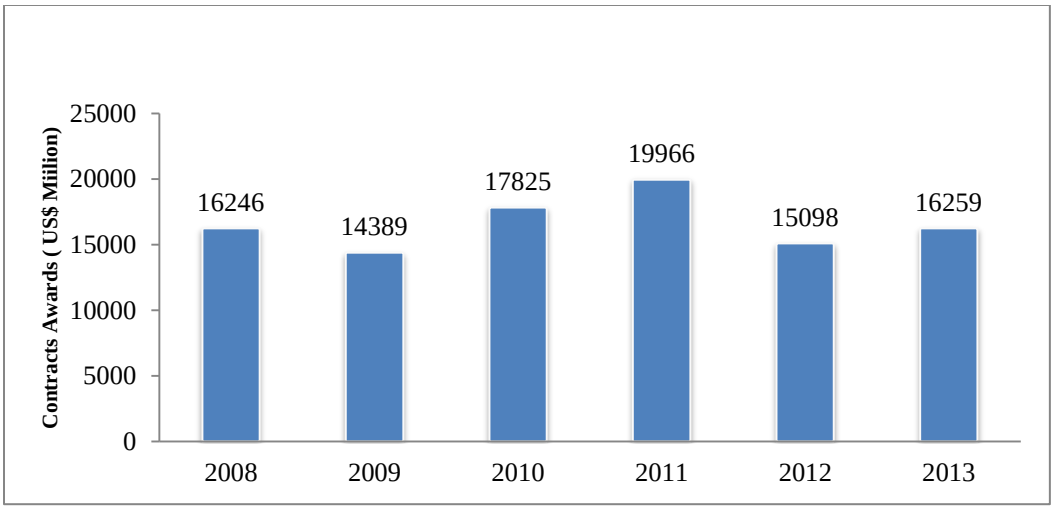

Figure 8. Power and Water Construction Contract Awards (US $ Million), 2008-2013 (data from Ventures, 2011)

For the construction of Saudi buildings, it is forecasted that the buildings' sector will be of high importance along with continuous increase in contract awards. It was observed that the buildings' sector rose from USD 30.6 million in 2008 to USD 47.1 million in 2012. It is expected that the contract awards would further increase to a great extent i.e. USD 49.9 million in 2013, (Ventures, 2011) as shown in figure 9:

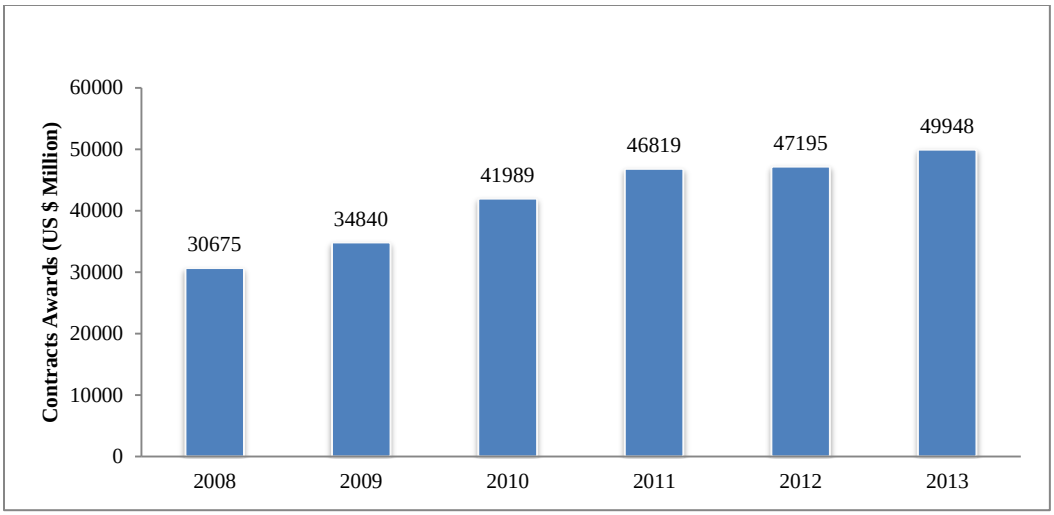

Figure 9. Building Construction Sector Contract Awards (US$ Million), 2008-2013 (data from Ventures, 2011)

The last construction industry sector: infrastructure sector, received USD 16.5 million in the year 2012 and it is estimated that the contract award will increase to USD 17.3 million by 2013 (Ventures, 2011), as shown in figure 10:

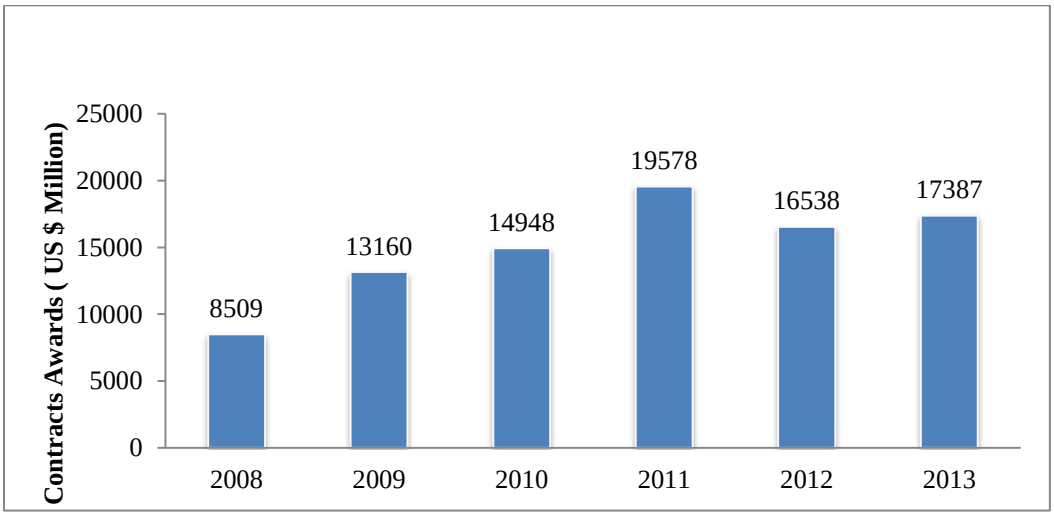

Figure 10. Infrastructure Construction Contract Awards (US$ Million), 2008-2013 (data from Ventures, 2011)

2.4 Comparison between Saudi Arabia and GCC Countries

To compare between Saudi Arabia and other GCC countries a few key factors should be evaluated. These factors will highlight how and why Saudi Arabia significantly differs from Oman, Qatar, Kuwait, Bahrain and U.A.E in GCC.

2.4.1. Comparison between the Economic conditions of Saudi Arabia and GCC Countries

With the increase in oil prices in the past years and stabilized economy, the GCC countries have shown greater development over the years. Due to such conditions, GCC countries have low interest rates with greater fiscal and external surpluses, moderate consumer prices inflation, and greater and positive opportunities for growth in the forthcoming years.

With the passage of time, the real GDP growth in 2011 outdid previous year's GDP growth rate. In 2011, the real GDP growth rate went high up at 7.5 percent – the greatest real GDP growth since 2003 (IMF, 2012).

In 2009, the total real GDP of the GCC countries witnessed a decline but this situation was soon stabilized in the year 2010 with around 6 percent. In addition, the year 2011 remained prosperous for GCC countries as the real GDP rose to 7.5 percent (IMF, 2012), as shown in figure 11:

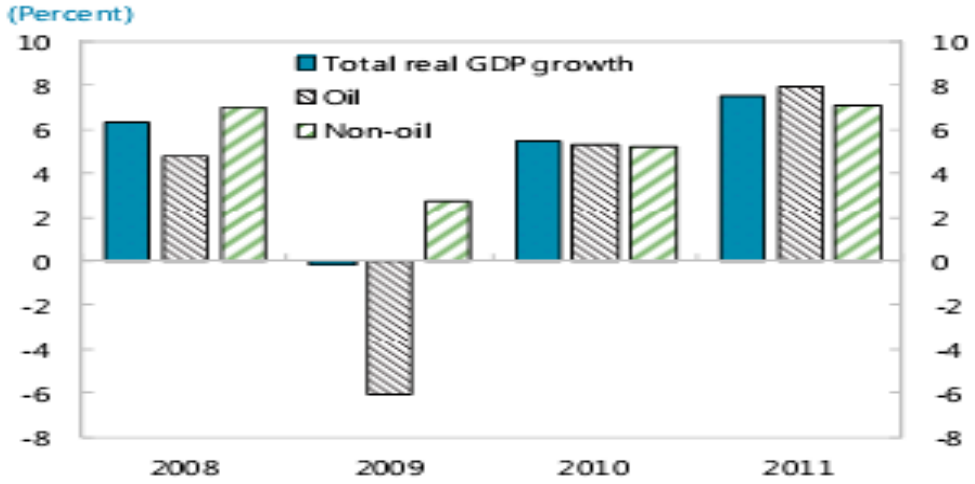

Figure 11. Total Real GDP Growth, 2008-2011 (data from IMF, 2012)

The non-oil real GDP growth of the GCC countries i.e. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE shows extra-ordinary results. In the year 2011, Qatar was the leading GCC country with the highest growth rate followed by Saudi Arabia, Oman, Kuwait, Bahrain, and UAE, as illustrated in figure 12:

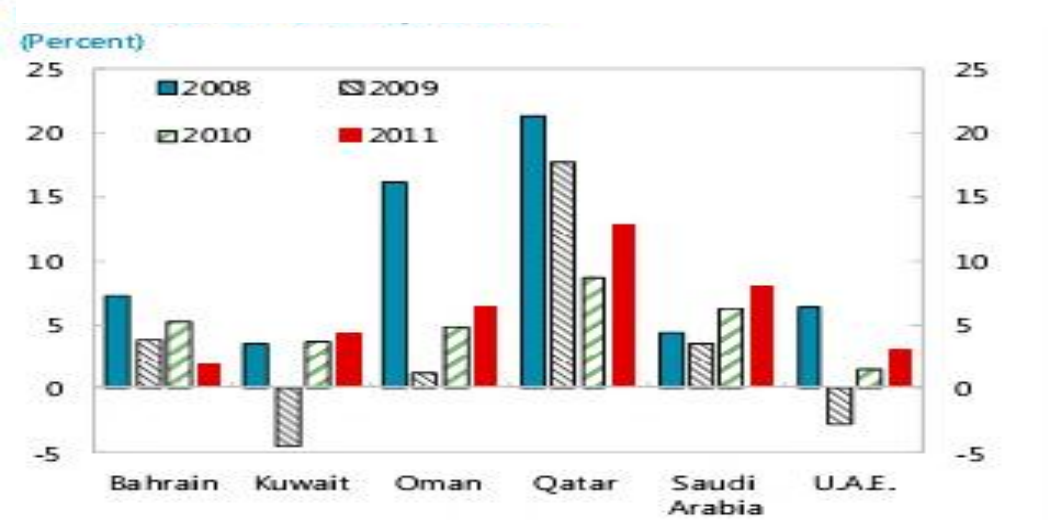

Figure 12. Non- oil Real GDP Growth, 2008-2011 (data from IMF, 2012)

Qatar has been taking the lead among all GCC countries in terms of non-oil sector real GDP growth since 2008, and only in 2010 the real GDP growth rate of non-oil sector declined to single digit but still remained the leading country among the GCC countries (IMF, 2012).

2.4.2. Comparison of construction costs between Saudi Arabia and other GCC countries

According to EC Harris (2012), the construction costs in Saudi Arabia are the cheapest compared to other countries in the Middle East. On the other hand, it was also observed that Bahrain's construction costs are the highest compared to any country in Middle East. It was indicated in the research that the difference in the construction cost between Saudi Arabia and Bahrain is almost half.

In the research presented by EC Harris (2012), it was mentioned that the construction costs in the Gulf region were quite similar to the construction costs in Europe. In addition, Saudi Arabia was considered a cheap country in terms of construction cost. According to EC Harris Regional Head of Cost and Commercial Management in Middle East, Nick Smith: "*As compared to other countries in GCC, Saudi Arabia has the most competitive market in terms of construction costs, this is due to high profit and low overheads With steel factories available in Saudi Arabia along with abundance of raw material, Saudi Arabia's government is able to keep the construction costs lower than 10 percent as compared to other GCC countries in the region."*

The research conducted by EC Harris (2012) presented an overview of the construction costs in Bahrain which are quite similar to those in UK whereas, the

construction costs in Qatar are almost equal to those in Bahrain with only difference of 6 percent. It was an interesting finding that the construction costs in Qatar are even greater than larger and more developed nations including China, U.S.A and Russia.

According to this research, U.A.E is only 9 percent behind Bahrain and only 3 percent less than Qatar in terms of construction costs. The United Arab Emirates is ranked as the third most expensive country in Middle East while Saudi Arabia is ranked the cheapest in terms of construction costs. However, Oman is ranked fourth after Bahrain, Qatar and U.A.E with only 11 percent difference between the construction cost of Bahrain and UK (EC Harris, 2012).

2.4.3. Profit margin of Saudi Arabia and other GCC countries

Cement is the major element of the construction industry and is the main reason behind the growth of the construction industry. It was observed that after the economic crisis, the revenues of the GCC countries declined but with the passage of time the economy gradually recovered. The revenues of the GCC countries increased to about USD 4.6 billion in 2011 (14.2 percent). After the stabilization of economy, Saudi Arabia led the cement industry followed by the rest of the GCC countries except for Qatar and Bahrain. The other countries that followed Saudi Arabia were Oman, U.A.E and Kuwait respectively (Ventures, 2012).

For the first time since 2008, UAE had an increase in its sales revenue after the total collapse of the cement industry due to the economic crisis. Even after the increase in sales with the current economic conditions, the sales revenue of U.A.E's cement industry shows negative net profit. With Saudi Arabia's ability to produce cement with low fuel

and raw-material costs, the country is able to gain an edge over other cement markets (Ventures, 2012). This is due to the increasing cement consumption in Saudi Arabia, as shown in figure 13:

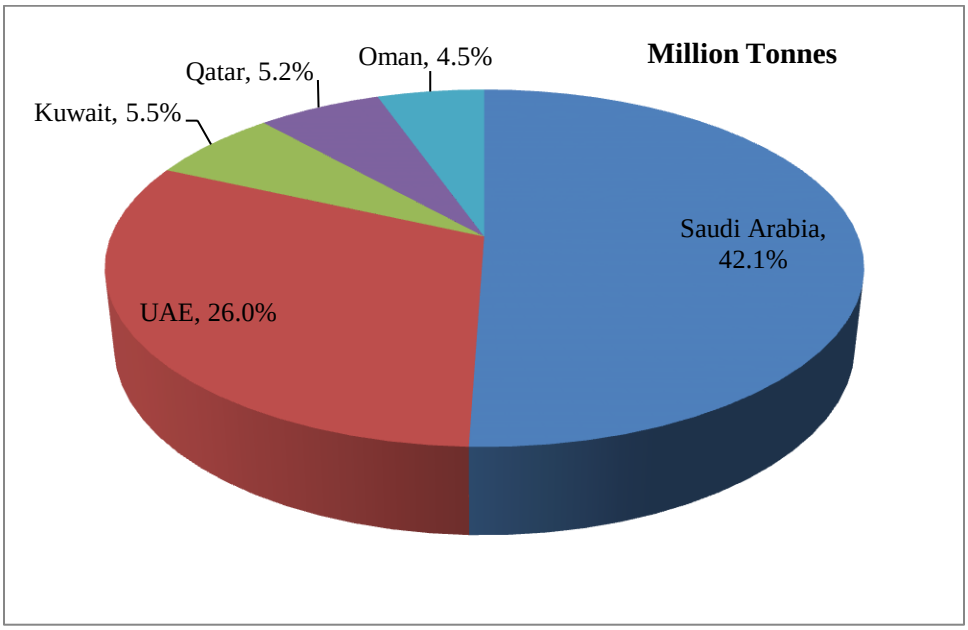

Figure 13. GCC Cement Construction Share (data from Al Jazira Capital, 2011)

With the availability of natural resources, Saudi Arabia is capable of producing cement comparatively cheaper than other GCC countries (Al Sheikh, 2012). The low costs of production contribute to the increase in profit margin. The costs of cement's production per ton in Saudi Arabia were USD 30.9 in the year 2011. This was the lowest cost of production of cement compared to other countries. With such low cost, the profit ratio of Saudi Arabia is comparably higher than others in the market. The costs of production of cement in other countries were USD 37; slightly higher than they were in Saudi Arabia, followed by U.A.E and Kuwait with production costs of cement USD 47.8 and USD 59.2 respectively (Ventures, 2012), this is shown in figure 14:

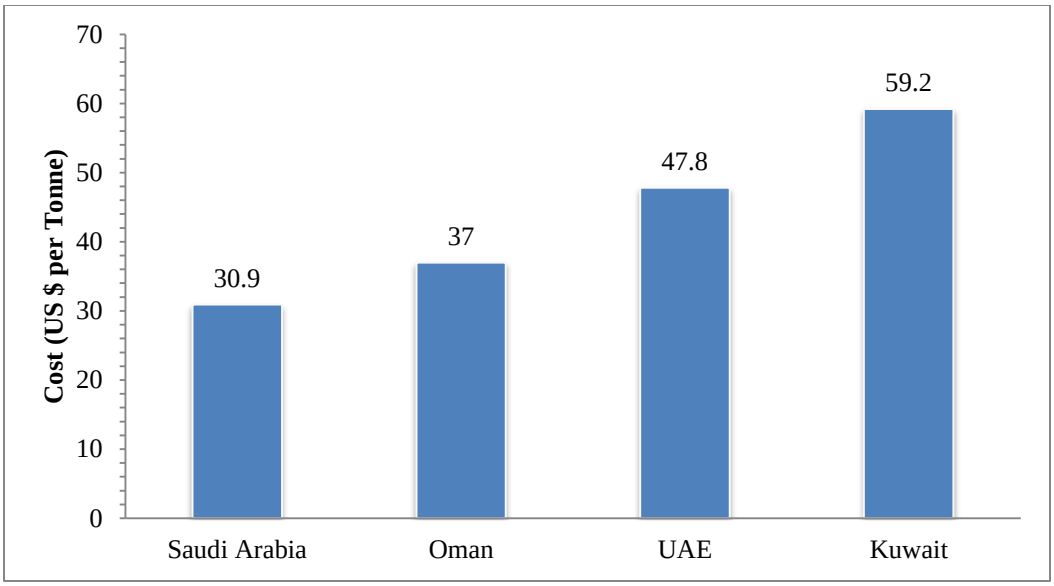

Figure 14. Cement Cost per Tonne (US $ per tonne) (data from Ventures, 2012)

As we can see here, the gross margin of Saudi Arabia was the highest with USD 30.9. The country's gross margin was around 51.80 percent in December 2011 followed by Oman, Kuwait and U.A.E with gross margin 45.70 percent, 26.00 percent and 15.50 percent respectively (Ventures, 2012), as shown in figure 15:

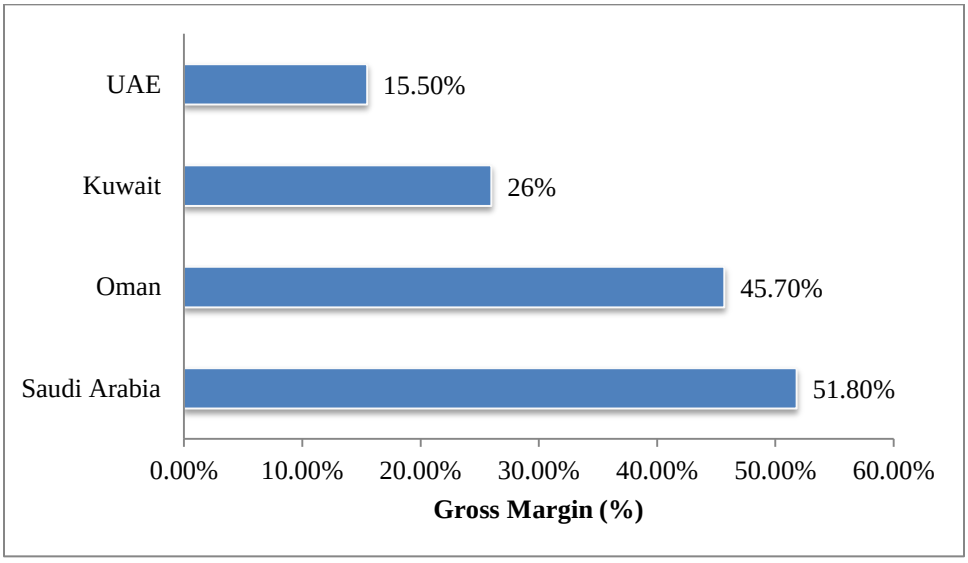

Figure 15. GCC Cement Industries Gross Margins (%) (data from Ventures, 2012)

2.5 Factors that led to the escalation of housing and construction costs

There are certain factors that affected the cost to escalate in the housing and construction industry. With the increase in complexity of the building, there lies a probability of increase in the construction cost. There can be different economic factors responsible for the increasing housing and construction costs. For instance, the increasing oil prices serve as the major cause behind the rising housing and construction costs. Apart from this the increasing construction cost are also because of the increasing prices of other resources like labor and other construction resources. Hence, shortage of labor and other construction resources also tend to increase the overall construction cost (Omoreigie and Radford, 2005). Apart from this the low supply of housing also directly influenced the construction and housing costs. This is further supported by the increase of inflation rate. Aibinu and Jagboro (2002) revealed that the government's policies and regulations also directly influence the construction and housing costs. Apart from this, according to TELL (2002) the corruption and some fraudulent practices on the part of the government, suppliers, and contractors also directly affect the housing and construction costs. This was further supported by the research studies of Husseini (1991) and Frimpong, Oluwoye and Crawford (2003). On the demographic level, the increase of population's level results in the increase of costs of construction and this leads to increase the demand on housing.

Some of the factors that led to costs' escalation in housing and construction industry in Saudi Arabia are as follows:

2.5.1. Economic Factors

Oil is the major commodity of the GCC countries and this indicated that the non-oil real growth rate would decline to some extent. According to a forecast, it was expected that the non-oil real GDP would remain strong but would slightly fall below 7 percent in 2011 to 6 percent in 2012 and would further decrease to 5.5 percent in 2013 (IMF, 2012). This decline in the growth rate indicates lower levels of spending from the government along with weaker external conditions.

The oil sale revenue looks unpromising due to uncertain economic environment and long-term challenges. It was predicted that the crude-oil price per barrel would fall below USD 100 per barrel by 2015. It was also forecasted that the increase in government spending along with fiscal and external surpluses would turn to deficit, if the policies of GCC countries remain the same.

Labor costs were another major reason for the escalation in construction industry's costs. The increase in labor costs would directly affect construction costs to boom upwards resulting in greater cost requirements for the completion of projects. According to a research conducted by MEED (Middle East news, data and analysis); business service intelligence, Saudi Arabia has the highest labor construction costs in the Gulf region (Meed Cost Indices, 2012b), this research further indicated that the labor construction costs in Saudi Arabia are average (Mesbah, 2012).

The increase in government expenditure is another major reason for the costs escalation in the construction industry. Along with such increase, the breakeven price of oil has continued to grow which eventually led the costs of construction industry to

escalate even higher. The increase in costs reduces the profit margin to a great extent in GCC countries especially that oil makes most of the country's revenue.

In order to enhance Saudi Arabia's position in the market, the government of Saudi Arabia has decided to provide its citizens with employment opportunities by building four economic cities namely King Abdullah economic city, Prince AbdulAziz bin Mousaed Economic City, Knowledge Economic City, and Jazan Economic City. By constructing such economic cities, the government of Saudi Arabia aims to enhance the GDP as these cities once are completed would provide the Saudi nationals with employees to work on reducing the construction costs (Alpen Capital, 2012).

2.5.2. Geographic, Demographic and Social Factors

Demographic:

Within the last decade, the construction industry in the GCC countries has witnessed an increase in the population. It was observed that the population of the GCC countries witnessed a great boom during 2003-2009. The population within these years grew to 3.5 percent as compared to global growth of 1.3 percent within the same time-frame. Saudi Arabian population growth rate is 2.90 (central department of statistics and information). Urbanization was another factor that was witnessed in the GCC countries. According to a research conducted last year, it was observed that GCC countries such as Kuwait and Qatar have 90 percent of their population living in urban areas whereas; only 10 percent of the population lives in rural areas. This indicates that there is still room for growth in GCC countries and more growth opportunities for countries like U.A.E and Saudi Arabia that have higher population as compared to other GCC countries (Alpen Capital, 2012).

With 50 percent of the population between the ages of 15 to 65 years, it was observed that in the forthcoming years the GCC countries would have higher number of young and energetic workforce. It was also observed that changing lifestyle and shift from single to nuclear families is on rise and with such shifts; the housing demand would eventually increase. This shift in the demographics has major contribution in the cost escalation of construction industry (Alpen Capital, 2012).

Geographic:

Most of the GCC countries are located in hot environment but at the same time enjoy quite advantages over other countries. The GCC countries are provided with abundance of oil reserves that makes the most of the country's GDP and revenue. Along with such abundance of oil reserves, the GCC countries are blesses with natural resources such as gold, copper, limestone etc. Due to such abundant availability of natural resources, the construction costs in such countries are quite less compared to other countries like USA and UK.

With Saudi Arabia being the least expensive country in terms of construction's costs, the profit margin is quite high compared to other GCC countries. With comparable higher profit margin, Saudi Arabia is able to reduce its construction's costs to a great extent whereas; the construction's costs in U.A.E., Kuwait and Qatar are quite high as these countries have higher raw material's costs.

Due to favorable geography of GCC countries, the member countries enjoy favorable policies from government and strong attraction of foreign companies in the construction industry. This attraction has allowed the GCC countries to handle large and complex

construction projects by either entering into partnership with foreign companies or joint ventures.

Social Factors:

To successfully meet the high and complex demands, it is essential to have skilled labor. In the case of Saudi Arabia, the situation is quite opposite. Saudi Arabia has constantly attracted diversified workforce in construction's industry, the number of skilled and qualified labor has gradually decreased making it comparably difficult for the Saudi Arabian government to meet the never ending demands of complex structures. Due to skills shortage, the construction cost is expected to grow in the forthcoming years (Deloitte, 2012b).

Saudi Arabia and Abu Dhabi being a social hub has provided an opportunity for the government. By using such diversified labor, there is wider opportunity available for the Saudi Arabian government to turn the country into a major social and economic hub. By doing so, the construction's costs would gradually decrease to a great extent (Deloitte, 2012b).

In 2010, to narrow the gap that was created and to develop human resources by providing vast opportunities, the Saudi Arabian government approved five year development plan worth (USD 384 billion). This development plan was aimed to enhance and develop human resources, education and skills to labor. This plan has gradually decreased the costs escalation in the construction's industry as this development plan would create a large number of job opportunities in the industry. The greater availability of jobs, the greater there is a chance to reduce costs escalation (Deloitte, 2012b).

2.5.3. Finance and Funding factors

Construction depends on quality of planning for complex and large projects but due to shortage in skilled labor in Saudi Arabia in the construction industry, there is a great chance for costs escalation. Planning is the most crucial stage that could gradually reduce costs of construction. To do so, contractors must be aware of current happenings and events along with the resources that would be needed for the project. In order to reduce costs of construction, the contractors should be provided with only resources they require. By doing so, the resources would be used in an efficient manner. Planning and scheduling both are crucial to reduce costs of construction. When done properly and accurately, the project costs can be reduced to a great extent.

Poor financing control is another factor that could gradually increase the costs of construction projects in Saudi Arabia. With lack of skills, controlling the entire project financially is another major problem for the Saudi Arabian construction industry. If the projects are not financially controlled, the costs of the construction projects can increase to a great extent. To eliminating this problem, the Saudi Arabian government should use proper and quality management tools and proper resources planning aimed to minimize the costs escalation.

With greater restrictions in Saudi Arabia the construction's companies are struggling to funds to complete their projects. The source of these restrictions is the tighter control of the government on the monetary supply. In order to acquire funds, the construction's companies are taking loans in order to fulfill the needs and requirements of their projects. This is a major reason for costs' escalation.

Bonds and payments are another source to acquire funds in Saudi Arabia. These financial sources in Saudi Arabia are issued by banks and are considered as additional support for contractors. The biggest hurdle for the construction's companies in Saudi Arabia is that the government requires bank guarantees from contractors even though the companies have the ability to complete the project timely with cash. The loans provided by banks for the completion of projects are backed by high interest's rate which makes it quite difficult for contractors to acquire loans in order to complete their projects.

Changes in the material costs are another factor that could gradually increase or decrease the costs of construction in Saudi Arabia. With the abundance of natural resources, the Saudi Arabian government is able to meet the demands of construction's sector, but the economic recession in the past few years had created several problems for such companies. Due to the economic recessionary period, the material's costs have increased which caused a great change in construction's costs. In the forthcoming years, it is expected that the Saudi Arabian government will be able to reduce the material's costs so that the construction's companies can take full advantage of the abundance of natural resources that are available in Saudi Arabia.

2.5.4. Environmental factors

Weather is a primary environmental factor that can lead to the costs' escalation in Saudi Arabia. Saudi Arabia has one of the most extreme climatic situations due to which there is a constant loss of productivity and inefficient use of resources. Furthermore, the maintenance costs in such extreme climatic situation have gradually increased due to constant maintenance. Contractors avoid working in such climatic situation because the

summer in this particular region is extremely hot and working in such situation has always been difficult for contractors and workers as well.

Corporate social responsibility is another major environmental factor that could enhance the costs of construction industry. Being blessed with natural resources and oil reserves, the Saudi Arabian government is focusing on preserving the natural resources so that the future generations can also benefit from such resources. In order to provide the construction industry with these natural resources, the Saudi Arabian government purchases the resources required from vendors at comparably high costs. Due to such factor, the costs of construction industry have gone quite high in the recent years.

2.5.5. Other Factors

The literature review reveals various factors that the researcher expects to be the reason for the increase in housing and construction's prices in Riyadh, Saudi Arabia. The review established that most economists consider high oil prices to be the initial powerful contributor to the increase in prices of construction materials. As Alhayat (2009) observed, "The expectations indicate that the prices of oil will be increased more due to high global demand especially in the winter season." As a result, "Expectations of rising prices of building materials are in line with the rise of oil" (Badran, 2012). Some construction material's companies incurred enormous losses due to the increase in petroleum material's process. Moreover, oil is currently in short supply so many companies have limited access to this vital resource. The high oil prices increased the prices for shipping materials overseas, which has resulted in the high prices that consumers have to encounter. Oil prices increase will be especially detrimental to small projects, because the modest budgets of small projects might not be enough to cover the

expensive construction materials. Thus, small-project contractors often slow their projects. The political limitations and revolutions in the Middle East also create scarcity in oil, because transportation companies do not want to transport oil across unstable regions. Alsafhan (2011) specified that "Contractors of construction have confirmed that the political revolution contributed to increased prices by 10%."

The Saudi government made a decision to build 500,000 houses to increase supply as a result to the high demand. However, some experts believe that this decision has not helped solving the problem; in fact, they claim it made the problem even worse. They explain it is because the renewed demand of construction materials will drive up the prices. Arabian Business (2012) mentioned: "A specialist warned that the multiplicity of government housing projects in 2012 will increase the constructions materials' prices and then increase the prices of housing units built by construction companies."

Likewise, other government projects are the reason for the increase of prices. "Saudi government is the major consumer for constructions materials due to building schools, hospitals, government buildings, and infrastructure" (Aljaliedy, 2011). These projects create a second source of demand, so both the Saudi citizens and government are competing over limited supplies.

Saudi Arabia has a high rate of population growth, which is also contributing to increased prices. The Saudi Economic Survey (2012) projects that property prices will only raise as demand in the country's growth. In fact, the growth is so high that the supply of housing might not catch up anytime soon. Saudi Arabia already suffers from a shortage in houses, as LaSalle (2010) remarks, "Saudi Arabia, the biggest Arab economy, is facing a massive housing problem due to rapid population growth." LaSalle (2010)

specified that this high demand requires 150,000 additional residential housing units per annum.

Some of the contractors and traders of construction's materials have been manipulating prices by creating an artificial shortage. Alhwish (2011) observed that the increased prices of construction's materials occurred because of the shortage in their supply, and the main reason behind this shortage is that some traders and contactors bought a huge amount of materials to store them and thirst the market. They resorted to this process because they knew that companies and consumers would buy from them due to the high demand of new housing units. The other cause of construction material's shortage according to Alhwish (2011) is that some traders export construction's materials to other countries because they want to increase the prices in Saudi Arabia. Moreover, these traders exploit the other countries to which they sell. These other countries have a great need for construction materials, so the traders can get away with selling the materials to them at very high prices.

The role of labor in housing is very important, because building houses is labor intensive. Unfortunately, Albaqamay (2012) notes that labor wages have increased by 30% in the market of housing and construction. Companies also have limited trained laborers at their disposal. Companies have to pay more to attract skilled laborers or projects will be delayed due to a shortage in skilled laborers. as a result the overall cost of building a house will raise even more.

The current prices trend in Saudi Arabia is so strong that it will not change course without the government acting as a moderator. As long as the government does not classify construction's quality or monitor the qualifications of construction's companies,

the problem will grow and thus further support the black market's dominion over the sector of housing and construction. Alhwish (2011) concludes that the Saudi government must focus on deterring the manipulation of traders rather than focusing on creating housing projects if it wishes to turn around the current prices' trend.

Riyadh city suffers from speculative purchases of undeveloped lands and corruption in selling/assigning lands. Studies have identified these two factors that contribute greatly to the increase of Riyadh's housing and construction's costs. Aleqtesadya (2012) explained, "There is a speculative undeveloped lands actions in Riyadh city, and that leads to making the problem worse." In addition, corruption in selling lands takes the form of an investor buying a very large piece of land in a housing area then refusing to sell or build on the land. Instead, the investor's goal is to hold onto that land for many years to increase the prices of other areas and to increase the prices of rental apartments. The Saudi government does not apply tax on land to prevent investors from keeping their lands, so the problem runs rampant, especially in Riyadh.

2.6 Strategies to minimize costs

According Master Builders Director of Housing Policy, Paul Bidwell "*the biggest problem for the construction industry is continuous rise of cost. These changes in the cost have substantially reduced the construction activity".* He added further that, "*there two major elements that have greatly influenced that cost are; land cost and construction cost."* (Master Builders, 2012)

By keeping in mind, what has been observed, few strategies are presented with an aim to minimize construction's costs. These strategies are as follows (Cooke and Williams, 2003; Mbachu and Nkado, 2004):

a) By ensuring efficient time management. By doing so, the contractor would be able to effectively design a plan on how to best utilize resources and could better develop and control the whole process. This can enable contractors to reduce costs by managing the resources being used and would reduce additional work allocation for which workers charge additional costs.
b) By ensuring adequate supervision, this will allow contractors to manage their construction's projects accordingly and eventually reduce the possibility of errors. Adequate supervision can also reduce idle time during construction process.
c) As for complex and large projects, it would be better for contractors to hire experienced and qualified workforce. The quality of work will be better and the chances of making mistakes would be near to zero which can cut costs.
d) By thinking of innovative solutions for unexpected problems. To do so, the government should give contractors sufficient time and resources along with full support to reduce construction's costs in Saudi Arabia.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The objective of this thesis is to study the main factors that lead to housing and construction costs' escalation, focusing on Saudi Arabia as a case study. The costs of housing and construction have increased significantly, about 200% more compared to the prices in 2006. The problem started in 2006, when the prices of real estate began to increase, and since that time the prices escalated exponentially. The prices are still high and unreasonable in the Saudi society. Buying a house with such escalating prices has become a dream. With the current prices, people in Saudi Arabia are obligated to take long-term loans (30 years) to own a house, whereas, a few years ago people used to take short-term loans to own a house (5-8 years). Since 2006, the real factors that are behind the increase of housing and construction's prices are still unknown. Many of the factors that led to the escalation in housing and construction's prices are in the literature. However, there have been limited studies to analyze and document the potential factors. All factors that are reported in the literature are assumed to contribute to prices' increase. In this thesis, all the reported factors are investigated with the goal of determining their impact on the housing and construction's prices in Saudi Arabia. Furthermore, the study investigated the potential strategic solutions on the long run to reduce prices or at least keep them at the current levels.

3.2 Participants

The goal is to collect responses from experts in the field of construction in order to be able to determine the main factors that increased the prices in housing and construction's market. Moreover, this should help the researcher find applicable solutions in order to avoid more prices' escalation in the future. When this survey is complete and published, it should contribute to highlighting some of the key factors that the Saudi government should properly address.

As mentioned above, in order to determine the key factors that increased costs, the thesis has used a survey that includes all the expected factors reported throughout the literature. The survey was conducted in one city in Saudi Arabia, the city of Riyadh, which is the capital of Saudi Arabia. The survey has been completed by large construction's companies, large construction material's suppliers, engineers, specialists in the field of housing and construction, economists, and some official employees who serve in high positions in the government. All of them are familiar with the problem and have great ideas on how to fix the current situation in housing and construction market. The survey has been filled out by them in face-to-face sessions. The survey (page: 86) includes 16 questions regarding the expected factors that led to prices' escalation on a 5-point scale (Khalafallah, 2002). The scale points are: Very high = 5, High = 4, Normal = 3, Low = 2 and Very low = 1. A draft of the survey is included in Appendix - A.

3.3 Survey factors and the method of analyzing data

There are 16 questions divided into 8 main categories to facilitate understanding and analysis. These categories are listed below:

1) Escalation of Oil Prices: The increase in global demand of oil which led to the escalation of oil prices.

2) High Demand of Housing and Construction: This category includes high demand from, a) Saudi citizens, b) government housing projects, c) government public work projects.

3) Low Supply of Housing: This category includes a comparison between the increase of annul demand and the low supply of housing units.

4) Rapid Rise in Population's Growth: This category includes the high growth rate of Saudi population with more than 3%.

5) Shortage of Construction's Resources: This category includes: a) manipulation and monopoly of suppliers of cement, steel and other construction's materials, b) shortage of trained labor, c) black Market, d) export of construction's materials outside of Saudi Arabia.

6) Speculative Purchase of Undeveloped Lands: This category includes corruption in selling undeveloped lands.

7) High Inflation Rate: This category includes the continuous increase in construction's materials regarding the inflation factor.

8) Other Factors, such as: the absence of the government's role in monitoring prices, corruption in monitoring governmental projects, and contractors who take projects beyond their capacity.

To analyze the collected data, the researcher has used descriptive and quantitative methods to discuss the potential factors. The researcher used Microsoft Excel software to analyze the data statistically using methods such as calculating means, weighted averages, histograms, figures, and tables. One of the important methods used in analyzing the collected data of the survey was to observe the difference in factors based on their means and modes. Each question includes a 5-point scale (very high, high, normal, low, very low), and each of these choices has been quantified in order to calculate a numeric evaluation of the mean. This should illustrate the importance of each question (factor). Finally, in the statistical analysis of each factor 95% confidence interval allows inference toward the population.

CHAPTER 4

DATA COLLECTION AND ANLYSIS

4.1 Sample Size

The research was designed to determine the main factors of the prices' escalation of housing and construction in Riyadh, so the researcher collected data through a survey (Appendix A). Due to the limits of the statistical equation given below, the researcher must collect 215 samples or more to acquire accurate findings. The researcher obtained 237 samples to meet the required number of samples. The number of samples was calculated using the statistical equation of determining sample size for the estimation of mean (Eq. 1).

$n = (Z)^2 (б)^2 / (E)^2$ …….....…… (1)

Where

n is the sample size

z is the z value corresponding to the level of confidence

б is the standard deviation of the population

E is the maximum error (Mann, 1995)

Thirty random samples were taken to calculate the sample standard deviation for all 237 samples. Then, the average of those 30 standard deviations was calculated to determine the standard deviation (б) of equation 1, which is 0.89132 (Mann, 1995). The z value corresponding to a level of confidence of 90% is 1.645, and the maximum error was set to 0.1 (10%). Therefore, the required sample size is:

$n = (1.645)^2 * (0.89132)^2 / (0.1)^2 =$ ***214.9805***

Thus, the sample size should be more than or equal to 215, and the researcher obtained 237 samples from the survey.

The process of collecting data took two months and took place entirely in Riyadh, Saudi Arabia. Many of the surveys were filled out by employees who work at large construction's companies or at large construction material's suppliers. In addition, engineers, specialists in the housing and construction's field, economists, and some official employees who hold high positions in the government participated in the survey. This chapter shows the analyses of the survey data. Each analysis is designed to answer one question to help the researcher discover the potential factors that led to the escalation. The histogram method has been used to locate, with precision, the most frequently chosen number from the scale (very high = 5, high = 4, moderate = 3, low = 2, very low = 1). Furthermore, the mean for each question has been calculated to determine the main factors.

4.2 Data Analysis of the Factors

Factor 1: Oil Prices' Escalation:

The first question is to solicit experts' opinion on the effect of oil prices' escalation on increasing construction costs of housing projects. The question has been answered by 237 people. Out of the completed surveys, 25% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 26% of the respondents have evaluated the impact of this factor at 4 (High impact), 27% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 12% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 10% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 1and

Figure 16. The mean of the collected data is 3.426160338 and the standard deviation is 1.262157498, as shown in Table 2.

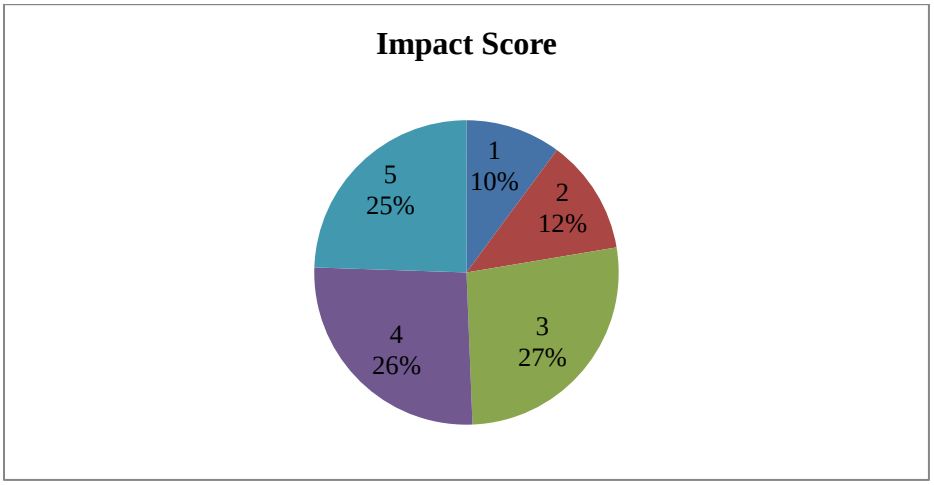

Figure 16. Impact of oil prices on construction costs' increase

Table 1. Oil prices' escalation.

Bin	*Frequency*
1	24
2	29
3	64
4	62
5	58

Table 2. Statistical analysis of response to question1.

	Q1
Mean	3.426160338
Standard Error	0.08198594
Median	4
Mode	3
Standard Deviation	1.262157498
Sample Variance	1.59304155
Kurtosis	-0.78427821
Skewness	-0.41231071
Range	4
Minimum	1
Maximum	5
Sum	812
Count	237
Confidence Level (95.0%)	0.161517782

Factor 2: Increasing Demand of Construction's Materials:

The second question is to seek experts' opinion on the increasing demand of construction's materials due to government subsidization of housing projects, and the effect of high demand of construction's materials on increasing construction costs of housing projects. The question has been answered by 237 people. Out of the completed surveys, 21% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 33% of the respondents have evaluated the impact of this factor at 4 (High impact), 30% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 12% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 4% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 3 and Figure 17. The mean of the collected data is 3.565400844 and the standard deviation is 1.058132923, as shown in Table 4.

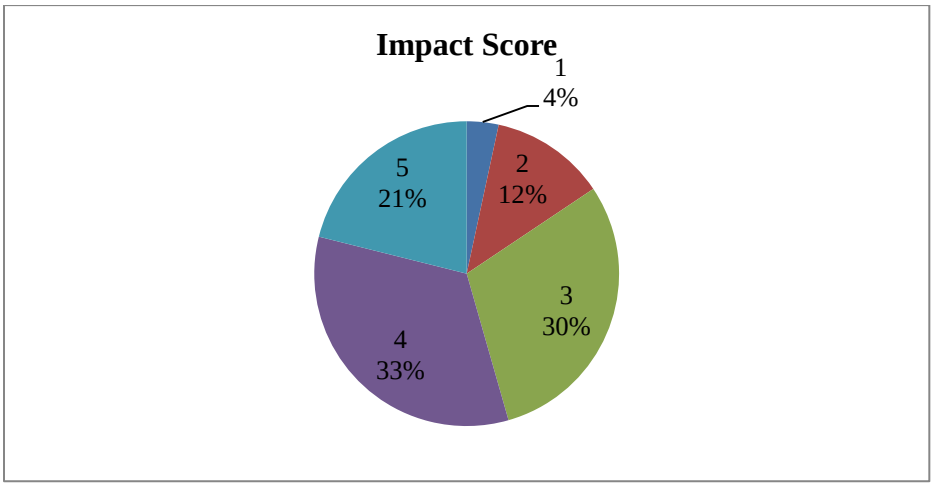

Figure 17. Impact of increasing demand of construction's materials on housing costs

Table 3. Increasing demand of construction's materials.

Bin	*Frequency*
1	8
2	29
3	71
4	79
5	50

Table 4. Statistical analysis of responses to question 2.

Q2	
Mean	3.565400844
Standard Error	0.068733119
Median	4
Mode	4
Standard Deviation	1.058132923
Sample Variance	1.119645284
Kurtosis	-0.46416528
Skewness	-0.37886314
Range	4
Minimum	1
Maximum	5
Sum	845
Count	237
Confidence Level (95.0%)	0.13540884

Factor 3: Increasing Demand of Engineering Services to Support Development of Public Work Projects:

The objective of third question is to seek experts' opinion on the increasing of demand of engineering services to support development of public work projects. (Government projects, such as schools, hospitals, and other infrastructure related projects). This factor is believed to be the reason of the increase in construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 17% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 28% of the respondents have evaluated the impact of this factor at 4 (High impact), 29% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 19% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 7% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as

shown in Table 5 and Figure 18. The mean of the collected data is 3.29535865 and the standard deviation is 1.155907624, as shown in Table 6.

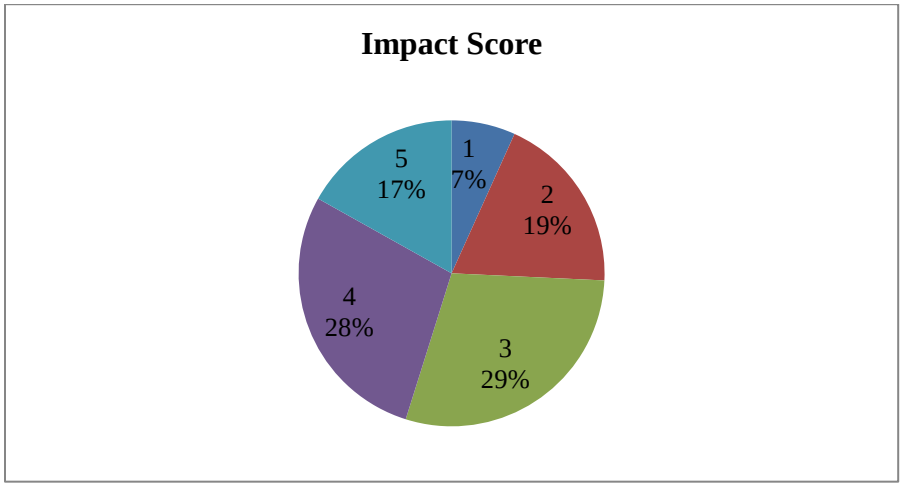

Figure 18. Effect of increasing demand of engineering services of public work on housing costs

Table 5. Increasing demand of Engineering's services.

Bin	*Frequency*
1	16
2	45
3	69
4	67
5	40

Table 6. Statistical analysis Of responses to question 3.

Q3	
Mean	3.29535865
Standard Error	0.075084269
Median	3
Mode	3
Standard Deviation	1.155907624
Sample Variance	1.336122434
Kurtosis	-0.78492494
Skewness	-0.19785909
Range	4
Minimum	1
Maximum	5
Sum	781
Count	237
Confidence Level(95.0%)	0.147921029

Factor 4: High Demand of Housing.

The goal of fourth question is to seek specialists' opinion on the impact of the high demand of housing on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 49% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 38% of the respondents have evaluated the impact of this factor at 4 (High impact), 9% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 3% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 1% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 7 and Figure 19. The mean of the collected data is 4.324894515 and the standard deviation is 0.812985506, as shown in Table 8.

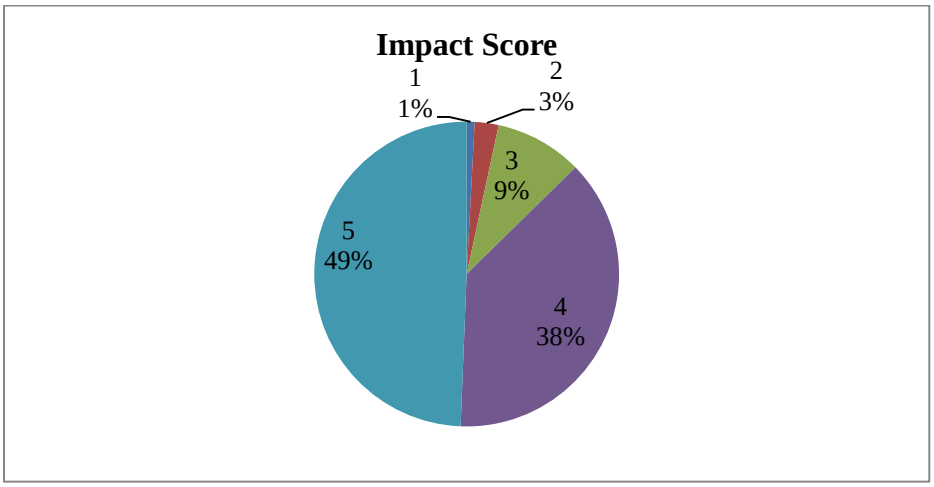

Figure 19. Impact of high demand of housing on construction's costs

Table 7. High demand of housing.

Bin	*Frequency*
1	2
2	6
3	22
4	90
5	117

Table 8. Statistical analysis of responses to question 4

	Q4
Mean	4.324894515
Standard Error	0.052809083
Median	4
Mode	5
Standard Deviation	0.812985506
Sample Variance	0.660945434
Kurtosis	2.063645782
Skewness	-1.32940621
Range	4
Minimum	1
Maximum	5
Sum	1025
Count	237
Confidence Level (95.0%)	0.104037425

Factor 5: Poor Construction's Productivity:

The fifth question is to seek specialists' opinion on the effect of poor construction's productivity on increasing construction costs of housing. The question has been answered by 237 people. Out of the completed surveys, 28% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 32% of the respondents have evaluated the impact of this factor at 4 (High impact), 27% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 11% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 2% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 9 and Figure 20. The mean of the collected data is 3.725738397 and the standard deviation is 1.060006787, as shown in Table 10.

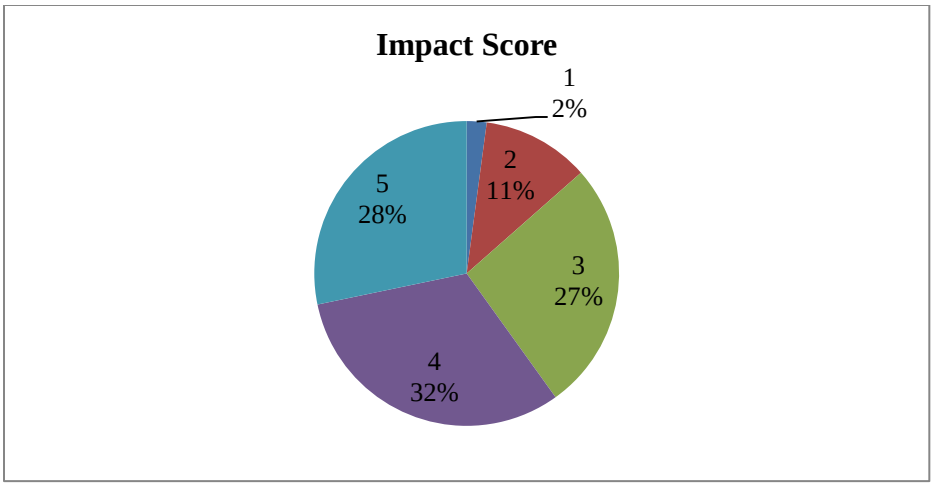

Figure 20. Impact of poor construction's productivity on housing costs

Table 9. Poor construction's productivity.

Bin	*Frequency*
1	5
2	27
3	63
4	75
5	67

Table10. Statistical analysis Of response to question 5.

	Q5
Mean	3.725738397
Standard Error	0.06885484
Median	4
Mode	4
Standard Deviation	1.060006787
Sample Variance	1.123614389
Kurtosis	-0.59413771
Skewness	-0.44465223
Range	4
Minimum	1
Maximum	5
Sum	883
Count	237
Confidence Level (95.0%)	0.135648638

Factor 6: Rapid Rise in the Rate of Population's Growth:

The sixth question is to solicit specialists' opinion on the influence of rapid rise in the rate of population's growth on the increase of construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 51% of the

respondents have evaluated the impact of this factor at 5 (Very High Impact), 34% of the respondents have evaluated the impact of this factor at 4 (High impact), 10% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 5% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 0% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 11 and Figure 21. The mean of the collected data is 4.29535865 and the standard deviation is 0.871694469, as shown in Table 12.

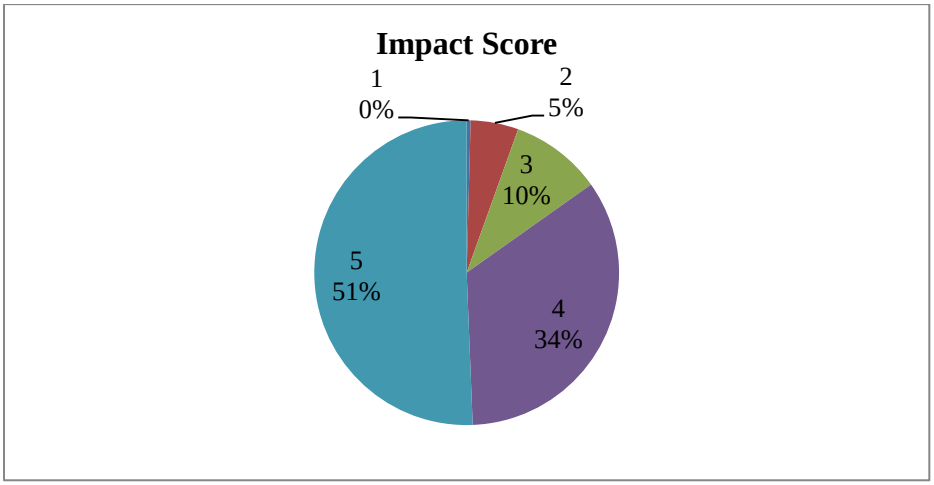

Figure 21. Effect of rapid rise in the rate of population's growth on construction costs

Table 11. Rapid rise in the rate of Population's growth

Bin	*Frequency*
1	1
2	12
3	23
4	81
5	120

Table 12. Statistical analysis of responses to question 6.

Q6	
Mean	4.29535865
Standard Error	0.05662264
Median	5
Mode	5
Standard Deviation	0.871694469
Sample Variance	0.759851248
Kurtosis	1.071632264
Skewness	-1.23229201
Range	4
Minimum	1
Maximum	5
Sum	1018
Count	237
Confidence Level (95.0%)	0.111550387

Factor 7: Monopoly and Other Unethical Practices of Suppliers:

The seventh question is to seek specialists' opinion about the effect of monopoly and other unethical practices of suppliers (cement, steel and other construction materials) on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 24% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 31% of the respondents have evaluated the impact of this factor at 4 (High impact), 30% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 12% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 3% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 13 and Figure 22. The mean of the collected data is 3.603375527 and the standard deviation is 1.071030906, as shown in Table 14.

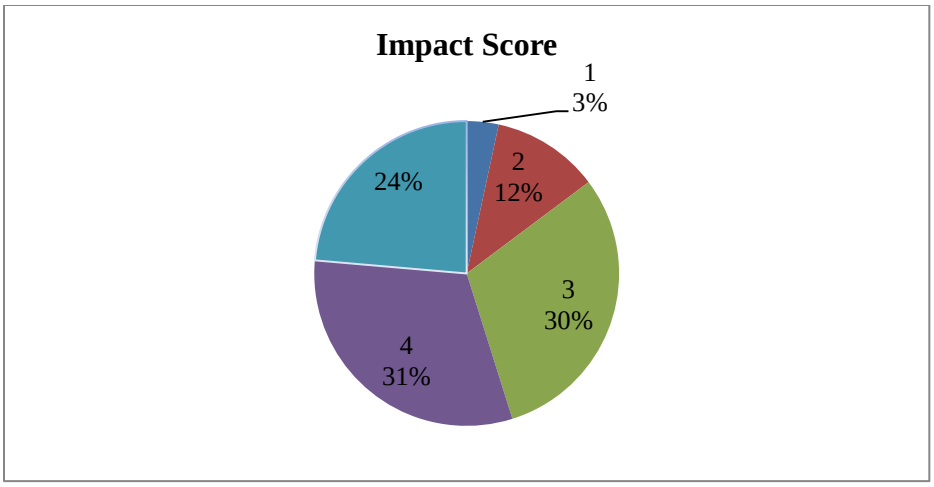

Figure 22. Impact of monopoly and other unethical practices of suppliers on housing's costs

Table 13. Monopoly and other unethical practices of suppliers

Bin	*Frequency*
1	8
2	27
3	72
4	74
5	56

Table 14. Statistical analysis Of responses to question 7.

Q7	
Mean	3.603375527
Standard Error	0.069570933
Median	4
Mode	4
Standard Deviation	1.071030906
Sample Variance	1.147107202
Kurtosis	-0.4939254
Skewness	-0.38641229
Range	4
Minimum	1
Maximum	5
Sum	854
Count	237
Confidence Level(95.0%)	0.13705939

Factor 8: Lack of Trained Labor:

The eighth question is to seek experts' opinion on the impact of lack of trained labor on increasing construction costs of housing. The question has been answered by 237 people. Out of the completed surveys, 21% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 30% of the respondents have evaluated the impact of this factor at 4 (High impact), 26% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 17% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 6% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 15 and Figure 23. The mean of the collected data is 3.426160338 and the standard deviation is 1.171623902, as shown in Table 16.

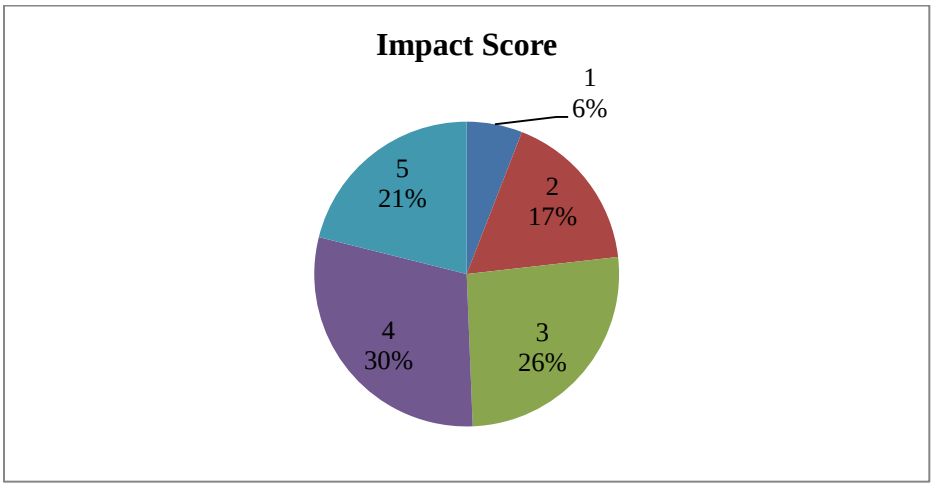

Figure 23. Impact of lack of trained labor on construction's costs

Table 15. Lack of trained labor.

Bin	*Frequency*
1	14
2	41
3	62
4	70
5	50

Table 16. Statistical analysis of responses to question 8.

	Q8
Mean	3.426160338
Standard Error	0.076105151
Median	4
Mode	4
Standard Deviation	1.171623902
Sample Variance	1.372702567
Kurtosis	-0.79858022
Skewness	-0.30693675
Range	4
Minimum	1
Maximum	5
Sum	812
Count	237
Confidence Level (95.0%)	0.149932235

Factor 9: Government's Poor Role in Monitoring Material's Prices:

The ninth question's objective is to seek specialists' opinion on the impact of government's poor role in monitoring material's prices of construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 28% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 36% of the respondents have evaluated the impact of this factor at 4 (High impact), 20% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 11% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 5% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 17 and Figure 24. The mean of the collected data is 3.721518987 and the standard deviation is 1.134251514, as shown in Table 18.

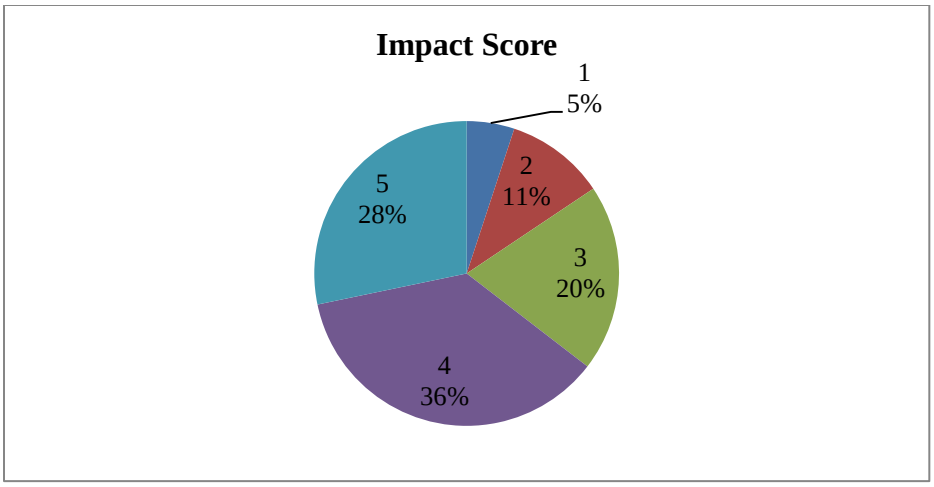

Figure 24. Effect of government's poor role in monitoring material's prices on housing costs

Table 17.Government's poor role in material's prices.

Bin	*Frequency*
1	12
2	25
3	47
4	86
5	67

Table 18. Statistical analysis Of responses to question 9.

	Q9
Mean	3.721518987
Standard Error	0.073677553
Median	4
Mode	4
Standard Deviation	1.134251514
Sample Variance	1.286526496
Kurtosis	-0.22835593
Skewness	-0.71813094
Range	4
Minimum	1
Maximum	5
Sum	882
Count	237
Confidence Level (95.0%)	0.145149705

Factor 10: Poor Inspection and Monitoring of Government Projects:

The subjective of the tenth question is to seek experts' opinion on the effect of poor inspection and monitoring system of government projects (leading to increased project duration) on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 22% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 27% of the respondents have evaluated the impact of this factor at 4 (High impact), 30% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 16% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 5% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 19 and Figure 25. The mean of the collected data is 3.459915612 and the standard deviation is 1.140304, as shown in Table 20.

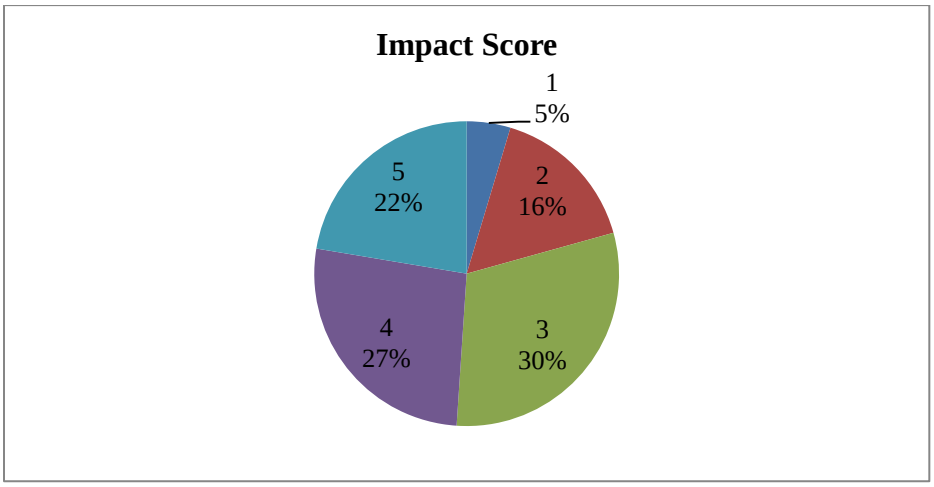

Figure 25. Effect of poor inspection and monitoring system of government projects on housing costs

Table 19. Poor inspection and Monitoring system of government projects.

Bin	*Frequency*
1	11
2	38
3	72
4	63
5	53

Table 20. Statistical analysis

Of responses to question 10.

Q10	
Mean	3.459915612
Standard Error	0.074070704
Median	3
Mode	3
Standard Deviation	1.140304
Sample Variance	1.300293213
Kurtosis	-0.77079247
Skewness	-0.24629634
Range	4
Minimum	1
Maximum	5
Sum	820
Count	237
Confidence Level (95.0%)	0.14592424

Factor 11: Existence of Black Market:

The eleventh question is to seek experts' opinion on the impact of the existence of black market (materials and labor) on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 26% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 32% of the respondents have evaluated the impact of this factor at 4 (High impact), 26% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 13% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 3% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 21 and Figure 26. The mean of the collected data is 3.641350211 and the standard deviation is 1.090239376, as shown in Table 22.

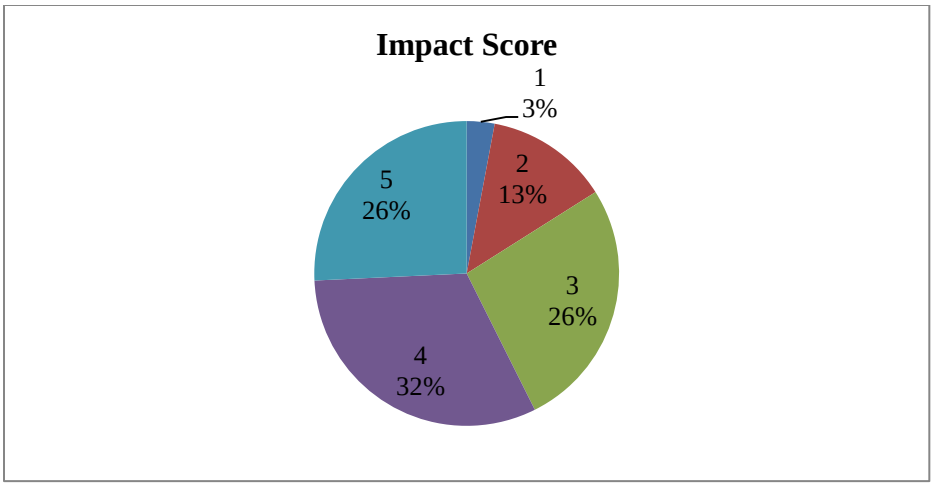

Figure 26. Effect of existence black market on construction and housing's costs.

Table 21. Existence of a black market.

Bin	*Frequency*
1	7
2	31
3	63
4	75
5	61

Table 22. Statistical analysis Of responses to question 11.

	Q11
Mean	3.641350211
Standard Error	0.070818658
Median	4
Mode	4
Standard Deviation	1.090239376
Sample Variance	1.188621898
Kurtosis	-0.62209988
Skewness	-0.41631613
Range	4
Minimum	1
Maximum	5
Sum	863
Count	237
Confidence Level (95.0%)	0.13951749

Factor 12: High Inflation Rate.

The twelfth question is to ask specialists' opinion on the effect of high inflation rate on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 13% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 28% of the respondents have evaluated the impact of this factor at 4 (High impact), 31% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 16% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 12% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 23 and Figure 27. The mean of the collected data is 3.130801688 and the standard deviation is 1.194878101, as shown in Table 24.

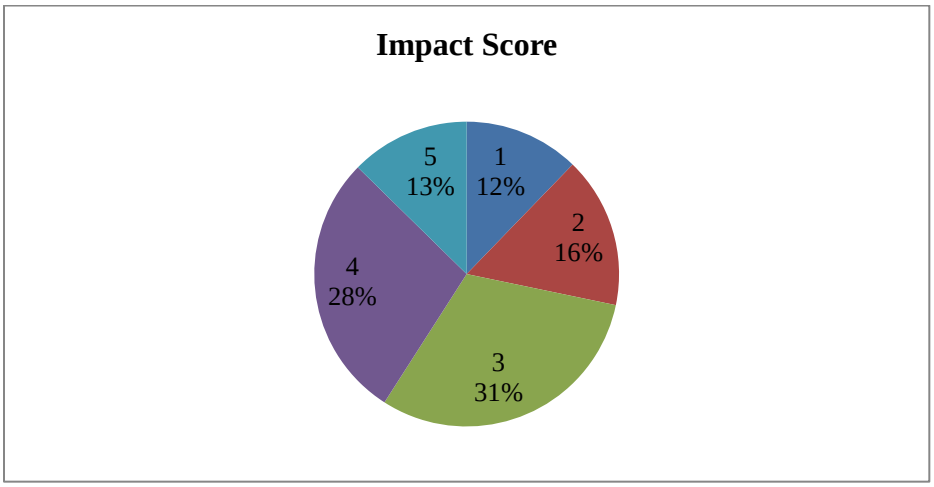

Figure 27. Effect of high inflation rate on housing and construction's costs

Table 23. High inflation rate.

Bin	*Frequency*
1	29
2	38
3	73
4	67
5	30

Table 24. Statistical analysis of responses to question 12.

Q12	
Mean	3.130801688
Standard Error	0.077615673
Median	3
Mode	3
Standard Deviation	1.194878101
Sample Variance	1.427733677
Kurtosis	-0.76888272
Skewness	-0.2398466
Range	4
Minimum	1
Maximum	5
Sum	742
Count	237
Confidence Level (95.0%)	0.152908065

Factor 13: Contractors Who Undertake Projects Beyond Their Capacity:

The thirteenth question is to ask specialists' opinion about the effect of contractors who undertake projects beyond their capacity on construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 25% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 27% of the respondents have evaluated the impact of this factor at 4 (High impact), 26% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 15% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 7% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 25 and Figure 28. The mean of the collected data is 3.483050847 and the standard deviation is 1.204481355, as shown in Table 26.

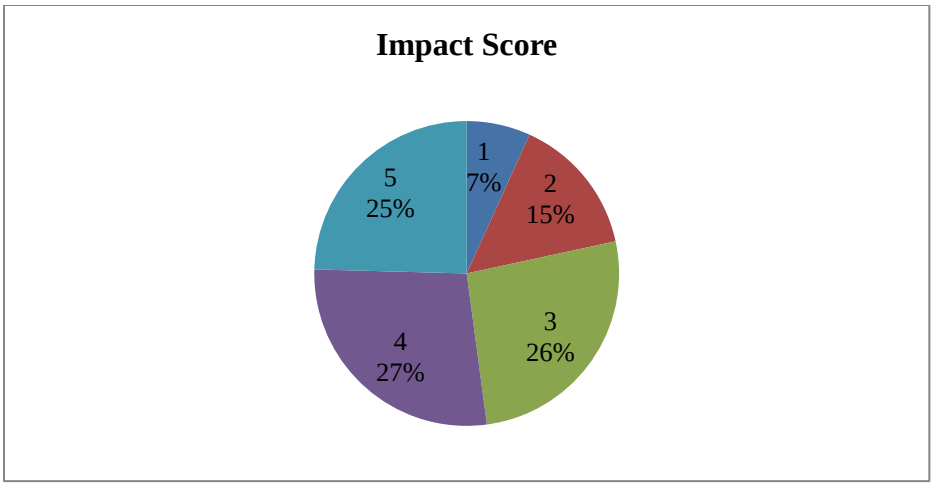

Figure 28. Impact of contractors who undertake projects beyond their capacity on housing's costs

Table 25. Contractors who undertake projects beyond their capacity.

Bin	*Frequency*
1	16
2	35
3	62
4	65
5	58

Table 26. Statistical analysis Of responses to question 13.

Q13	
Mean	3.483050847
Standard Error	0.078405058
Median	4
Mode	4
Standard Deviation	1.204481355
Sample Variance	1.450775334
Kurtosis	-0.7724095
Skewness	-0.37985282
Range	4
Minimum	1
Maximum	5
Sum	822
Count	236
Confidence Level (95.0%)	0.154466594

Factor 14: Speculative Purchase of Undeveloped Lands:

The fourteenth question is to ask experts' opinion on the influence of speculative purchase of undeveloped lands on increasing construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 52% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 35% of the respondents have evaluated the impact of this factor at 4 (High impact), 10% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 3% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 0% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 27 and Figure 29. The mean of the collected data is 4.35443038 and the standard deviation is 0.797846275, as shown in Table 28.

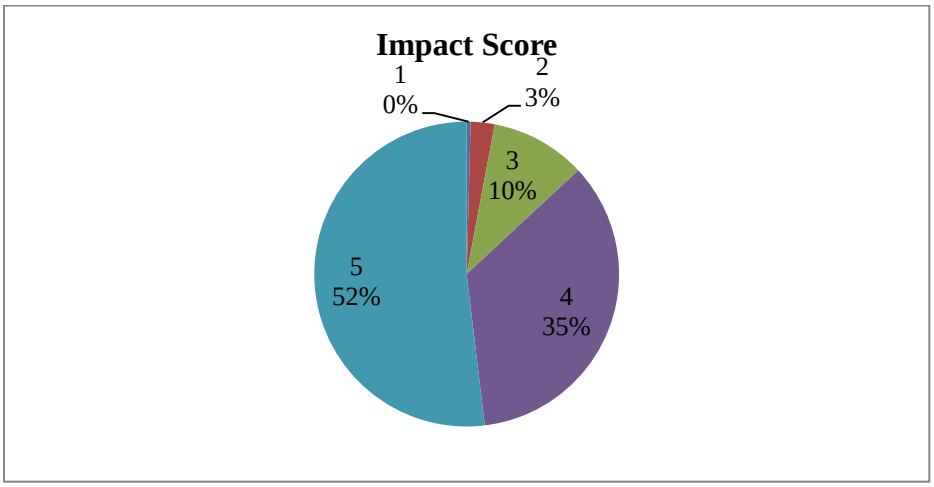

Figure 29. Effect of speculative purchase of undeveloped lands on housing and construction's costs

Table 27. Speculative purchase of undeveloped lands.

Bin	*Frequency*
1	1
2	6
3	24
4	83
5	123

Table 28. Statistical analysis Of responses to question 14.

Q14	
Mean	4.35443038
Standard Error	0.051825685
Median	5
Mode	5
Standard Deviation	0.797846275
Sample Variance	0.636558678
Kurtosis	1.406761508
Skewness	-1.23089158
Range	4
Minimum	1
Maximum	5
Sum	1032
Count	237
Confidence Level (95.0%)	0.102100064

Factor 15: Corruption in Assigning/Selling Undeveloped Lands:

The objective of the fifteenth question is to ask experts' opinion about the impact of corruption in assigning/selling undeveloped lands on construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 60% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 33% of the respondents have evaluated the impact of this factor at 4 (High impact), 6% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 1% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 0% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 29 and Figure 30. The mean of the collected data is 4.497890295 and the standard deviation is 0.704852867, as shown in Table 30.

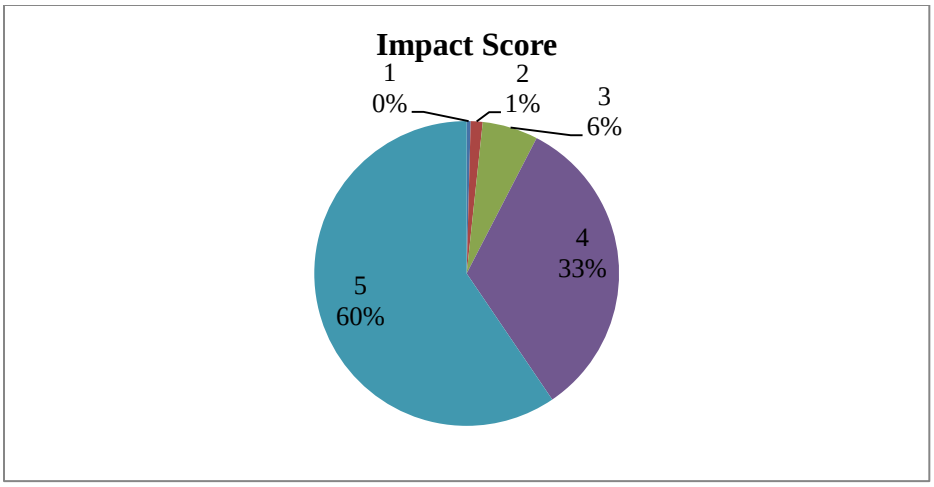

Figure 30. Influence of corruption in assigning/selling undeveloped lands on housing cost.

Table 29. Corruption in selling/ assigning of undeveloped lands.

Bin	*Frequency*
1	1
2	3
3	14
4	78
5	141

Table 30. Statistical analysis Of responses to question 15.

	Q 15
Mean	4.497890295
Standard Error	0.045785114
Median	5
Mode	5
Standard Deviation	0.704852867
Sample Variance	0.496817564
Kurtosis	3.137431774
Skewness	-1.56668002
Range	4
Minimum	1
Maximum	5
Sum	1066
Count	237
Confidence Level (95.0%)	0.090199735

Factor 16: Exporting Construction's Materials:

The sixteenth question is to solicit experts' opinion about the influence of exporting construction's materials on construction's costs of housing. The question has been answered by 237 people. Out of the completed surveys, 27% of the respondents have evaluated the impact of this factor at 5 (Very High Impact), 34% of the respondents have evaluated the impact of this factor at 4 (High impact), 23% of the respondents have evaluated the impact of this factor at 3 (Moderate Impact), 12% of the respondents have evaluated the impact of this factor at 2 (Low Impact), and 4% of the respondents have evaluated the impact of this factor at 1 (Very Low Impact), as shown in Table 31 and Figure 31. The mean of the collected data is 3.675105485 and the standard deviation is 1.108486375, as shown in Table 32.

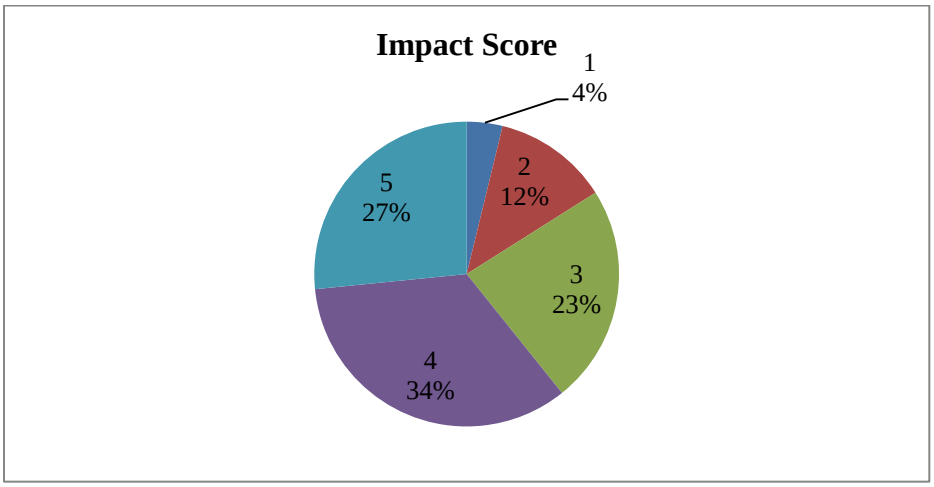

Figure 31. Impact of exporting construction's materials on housing costs

Table 31. Exporting construction's materials.

Bin	*Frequency*
1	9
2	29
3	55
4	81
5	63

Table 32. Statistical analysis Of responses to question 16.

Q16	
Mean	3.675105485
Standard Error	0.072003928
Median	4
Mode	4
Standard Deviation	1.108486375
Sample Variance	1.228742044
Kurtosis	-0.46006205
Skewness	-0.55291474
Range	4
Minimum	1
Maximum	5
Sum	871
Count	237
Confidence Level (95.0%)	0.141852551

A summary of the collected data is shown in table 33.

Table 33. Summary of frequencies, mean, mode, and standard deviations for factors

Factor	Mean	Mode	Std. Dev.	Impact score				
				5	4	3	2	1
Factor 1: Escalation of oil prices	*3.42*	*3*	*1.62*	*58*	*62*	*64*	*29*	*24*
Factor 2: Increasing demand of construction's materials	*3.56*	*4*	*1.05*	*50*	*79*	*71*	*29*	*8*
Factor 3: Increasing demand of engineering's services	*3.29*	*3*	*1.15*	*40*	*67*	*69*	*45*	*16*
Factor 4: High demand of housing	*4.32*	*5*	*0.81*	*117*	*90*	*22*	*6*	*2*
Factor 5: Poor construction's productivity (low supply)	*3.72*	*4*	*1.06*	*67*	*75*	*63*	*27*	*5*
Factor 6: Rapid rise in the rate of population's growth	*4.29*	*5*	*0.87*	*120*	*81*	*23*	*12*	*1*
Factor 7: Monopoly and other unethical practices of suppliers	*3.60*	*4*	*1.07*	*56*	*74*	*72*	*27*	*8*
Factor 8: Lack of trained labor	*3.42*	*4*	*1.17*	*50*	*70*	*62*	*41*	*14*
Factor 9: Government's poor role in monitoring material's prices	*3.72*	*4*	*1.13*	*67*	*86*	*47*	*25*	*12*
Factor 10: Poor inspection system of government projects	*3.45*	*4*	*1.14*	*53*	*63*	*72*	*38*	*11*
Factor 11: Existence of black market	*3.64*	*4*	*1.09*	*61*	*75*	*63*	*31*	*7*
Factor 12: High inflation rate	*3.13*	*3*	*1.19*	*30*	*67*	*73*	*38*	*29*
Factor 13: Contractors who undertake projects beyond their capacity	*3.48*	*4*	*1.20*	*58*	*65*	*62*	*35*	*16*
Factor 14: Speculative purchase of undeveloped lands	*4.35*	*5*	*0.79*	*123*	*83*	*24*	*6*	*1*
Factor 15: Corruption in assigning/selling undeveloped lands	*4.49*	*5*	*0.70*	*141*	*78*	*14*	*3*	*1*
Factor 16: Exporting construction's materials	*3.67*	*4*	*1.10*	*63*	*81*	*55*	*29*	*9*

CHAPTER 5

RESULTS AND RECOMMENDATIONS

5.1 The Goal of Results

Before the current study, the main antagonists of housing and construction's costs seemed extensively complex and were thus largely unknown. The researcher's goal was to reveal the main factors that increased housing and construction's costs in Riyadh. The research was conducted based on 237 opinions of specialists, experts, engineers, and individuals in related fields.

The Saudi government and people have been suffering severely from this problem because of its novelty. As the study shows, many factors contribute to this complex problem. The Saudi government has to identify and analyze the key factors that contribute to the increase of housing's costs across the nation through a scientific study such as this research before it can solve the problem. This study is considered a first attempt in the field of housing and construction's costs increase, which will help the Saudi government (specifically the Ministry of Housing) recognize the most important factors and their impact on housing and construction's costs. The Ministry of Housing will benefit greatly from this study and future research in creating long-term strategies to solve this problem. One of the unique characteristics of this study is that it identifies four main factors that affect housing's costs. In addition, the results of this research are organized in the order of importance, which should provide an easy reference tool for future studies. This research is published in Saudi Arabia.

5.2 Results of the Survey

Based on the results from the collected data, figures 32 and 33 show modes and means for each factor.

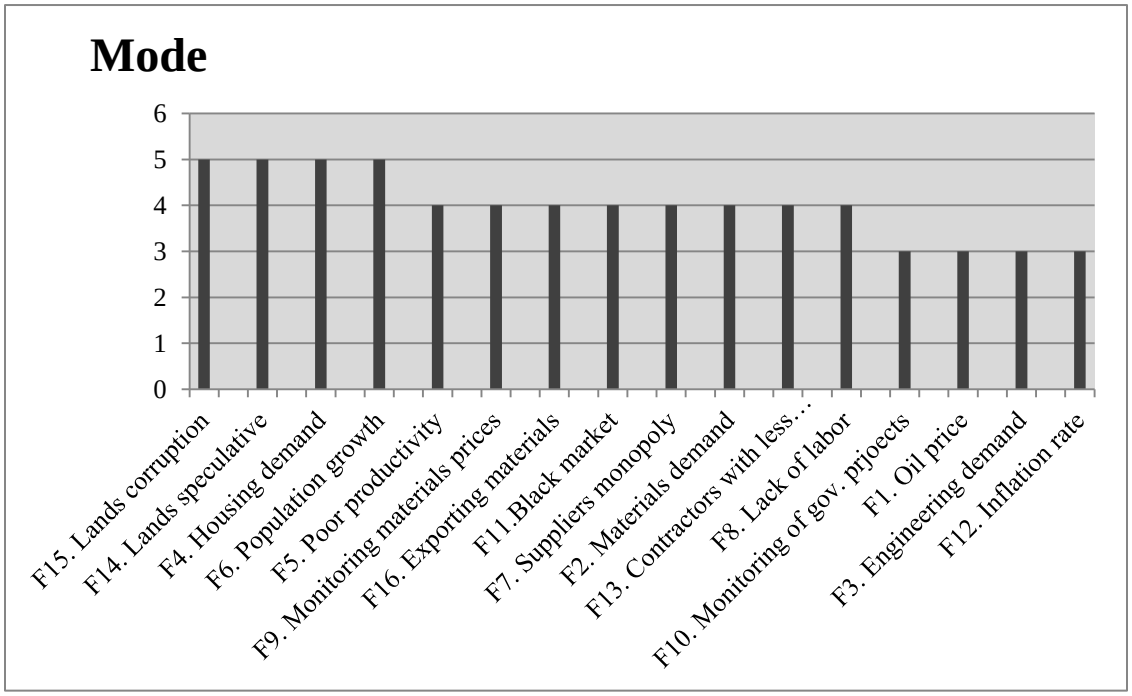

Figure 32. Modes of factors (Ascending order)

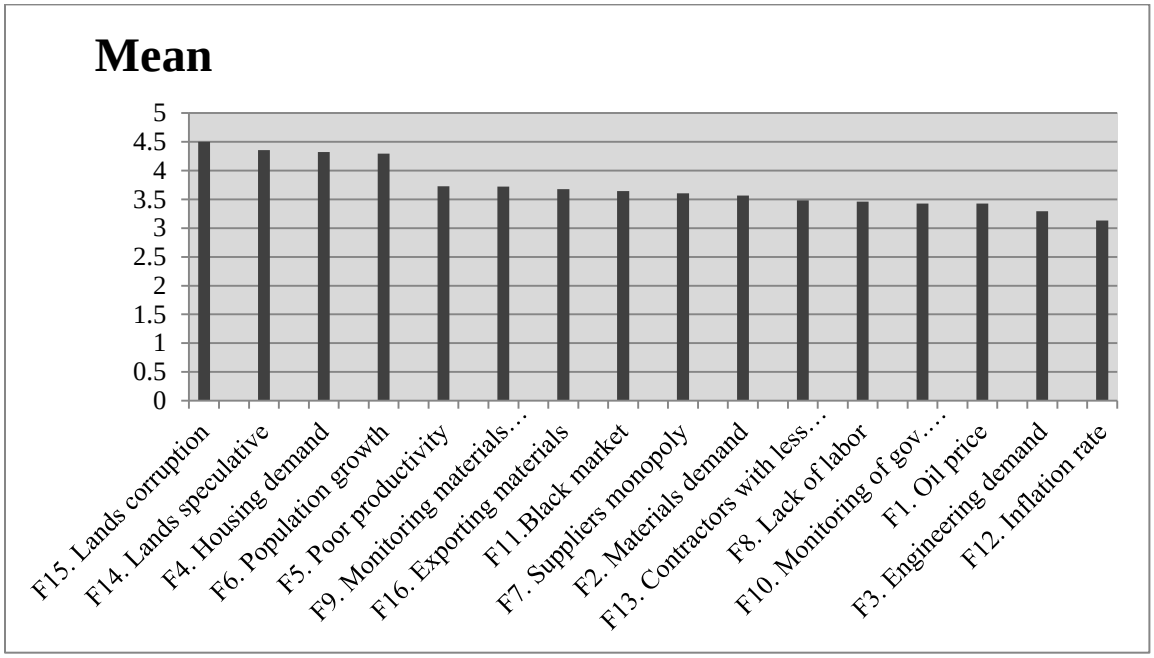

Figure 33. Means of factors (Ascending order)

According to the results of the modes, means, figures, and tables, the order of importance of the factors that have impacted construction and housing's costs are as follows, in table 34:

Table 34. Ranks of factors

Rank	Factor	Mode	Mean
1	F.15: Corruption in assigning/selling undeveloped lands.	5	4.49
2	F.14: Speculative purchase of undeveloped lands.	5	4.35
3	F.4: High demand of housing.	5	4.32
4	F.6: Rapid rise in the rate of population's growth.	5	4.29
5	F.5: Poor construction productivity, leading to low supply of housing.	4	3.725
6	F.9: Government's Poor Role in Monitoring Materials Prices.	4	3.721
7	F.16: Exporting Construction's Materials.	4	3.67
8	F.11: Existence of Black Market.	4	3.64
9	F.7: Monopoly and Other Unethical Practices of Suppliers.	4	3.60
10	F.2: Increasing Demand of Construction's Materials.	4	3.56
11	F.13: Contractors Who Undertake Projects Beyond Their Capacity.	4	3.48
12	F.8: Lack of trained labor	4	3.42
13	F.10: Poor inspection and monitoring system of government projects.	3	3.45
14	F.1: Escalation of Oil's Prices.	3	3.42
15	F.3: Increasing Demand of Engineering Services to Support Development of Public Work Projects.	3	3.29
16	F.12: High Inflation Rate.	3	3.13

5.3 Most Influential Factors and Recommendations to Address their Effects

The aim of this research is to identify the influences of the factors that contributed to the increase of housing and construction's costs. Based on the mean average and mode, the four factors are as follows:

1) The first main factor is **Factor 15**, which is corruption during assigning/selling undeveloped lands. The mean of this factor is 4.49, and the mode is 5. The present study, therefore, considers this factor to be the source of the problem, which is supported by the fact that many experts have claimed that the problem will be solved if this factor is addressed properly. At present, the Saudi government does not apply taxes to land ownership. According to TELL (2002), the corruption and other fraudulent practices on the part of the government, suppliers, and contractors also directly affect the housing and construction's costs. The corruption of selling undeveloped lands begins when investors buy a very large piece of land, such as one million square meters, in an undeveloped area. When the urban sprawl reaches their land in a few years, investors refuse to sell their land so that they can increase the price of all lands around it and thus control the market's prices. After waiting for the prices to skyrocket, investors start to sell pieces of the land at very high prices.

   Another form of corruption is when investors buy a very large piece of land in a developed area, and keep it for at least ten years with the goal of decreasing supply and increasing the prices of undeveloped areas. Investors accomplish this second form of corruption by creating an agreement among one

another to control the real estate's market. In addition, the Saudi government grants large tracts of land to some people in both developed and undeveloped areas, and those recipients can simply sell the land for high prices without any monitoring by the Saudi government. The government is in the best position to deter this corruption, because it can pass tax laws. Investors currently do not lose any money by holding onto lands. However, if the land comes with a tax, such as 10% of its appraised value, then the investors will have to sell the lands faster to avoid the cost leading to decreased prices.

Investors can make more money by avoiding paying property taxes and by selling quickly in a high-demand market. The recommendations for solving this problem are fourfold. 1) Apply a 15% tax on large plots of land to prevent monopolies, because "applying taxes on undeveloped areas will decrease the prices at least 30%" (Alhugail, 2012). 2) Monitor the prices of land, unify the areas of land, and establish harsh sanctions for manipulation. 3) Saudi Arabian government has to stop the grant lands in developed areas. 4) Prevent investors from owning large expanses of land in developed areas; without this monopoly, more owners can engage in trading. Solving the corruption problem requires serious actions from up high. Investors are already monopolizing enormous proportions of usable lands, so few solutions (the recommendations) other than applying taxes will help to solve the problem at this stage.

2) The second main factor is **Factor 14**, which is the speculative purchase of undeveloped lands. The mean of this factor is 4.35, and its mode is 5. This factor is related to the first factor, so both of them are considered the main source of the

complex problem of housing's costs. Purchasing either undeveloped or developed lands near housing areas in Riyadh has led to the high prices of developed lands. Moreover, "there is a speculative undeveloped lands actions in Riyadh city, and that leads to making the problem worse" (Aleqtesadya, 2012). Many investors have changed their businesses after the collapse of the stock market, thus complicating the problem. "After the stock market collapse, the investors went into the real estate market" (Bawardi, 2012). The speculators have an organized manipulation system among them to control the market. They bought many small pieces of land to keep for a few months, and then started to sell them individually at high prices. These practices are called speculative purchases operations, such as operations in the stock market.

Another form of speculative purchases is raising the prices once and refusing to decrease the prices until a lot of land is sold. Because of these operations, a piece of land in a developed area can be bought and sold many times in one week at different prices. The high demand of housing, which will be discussed next, makes this practice possible.

In general, speculators are exploiting the housing crisis and manipulating the market. Finally, the government is not playing its role regarding these speculative purchases while the Saudi people suffer from the housing crisis. The Saudi government must stop speculative operations, because its citizens are facing a housing crisis. Speculative purchases in the real estate's market are unjust, because people from all walks of life have equal rights to own a house.

This study makes three recommendations for deterring these purchases. 1) Prevent the speculative purchases in housing areas, and establish laws and conditions for buying and selling all types of land. 2) Create large land areas with services ready, and unify these areas into one large area so that large areas of land are purchased only once and for the sole purpose of building houses. 3) Unify the prices of land tracts within each area.

3) **Factor 4** holds the third strongest influence over costs, which is high demand of housing. The mean of this factor is 4.32, and it has a mode of 5. The demand of housing of Saudi citizens is so high that it created a shortage. LaSalle (2010) specified that this high demand requires 150,000 additional residential housing units per annum. Only the Saudi government can afford supporting this large number of units. Some of the shortage is due to the lack of natural resources, but a large portion of it has been created by investors.

The reasons behind the high demand of housing include 1) the government housing projects which have essentially contributed to the high demand of construction's materials, even though the government intended to decrease the high demand of these projects. 2) Public work projects, such as schools, hospitals, and infrastructure, have also contributed to the increased costs of housing and construction. 3) The high demand of housing from the citizens of Riyadh city comprises the main demand for housing, and this demand will be discussed in the next factor.

Saudi citizens are struggling to acquire both houses and apartments. Investors caused the high demand of housing by buying apartments and then

renting them to citizens, so the high demand of housing is shared by many parties; nevertheless, the main demand comes from the citizens. All of the previous reasons have increased housing's costs. When the government deters corruption and speculative purchases (the first two factors) it will already be contributing significantly to reducing the high demand of housing. The next four recommendations will address this problem. 1) Monitor the prices of construction's materials and unify the prices of each item. In addition, establish tough sanctions for manipulation, and prevent companies from storing construction's materials, thirst the market of those materials, and then sell the materials at high prices. Moreover, prevent companies from exporting construction's materials outside Saudi Arabia. 2) Ask international construction's companies with extensive experience to share their experiences in reducing costs and to obtain development strategies and good management for housing projects. 3) Unify prices of rental apartments. 4) Manage and control public work projects to decrease the prices of construction's materials.

4) The fourth most influential factor is **Factor 6**, which is the rapid rise in the rate of population's growth. The mean of this factor is 4.29, and the mode is 5. Saudi Arabian population growth's rate is 2.90 % (Central Department of Statistics and Information, 2012), which is contributing to the increase of prices of housing and construction. Saudi Economic Survey (2012) "projects that property prices will only raise as demand across the nation grows". In fact, the national growth rate is so high that the supply of housing will not catch up anytime soon. Saudi Arabia already suffers from a shortage in houses, as LaSalle (2010) remarks, "Saudi

Arabia, the biggest Arab economy, is facing a massive housing problem due to rapid population's growth." This high growth of population is what caused the third factor of the high demand of housing in Riyadh. High demand also presents tempting opportunities for investors to exploit supplies, leading to factors one and two. In short, all four top influential factors are interlinked. The Saudi Arabian population is currently around 29,195,000, and the population of Riyadh alone is around 5 million, putting 17% of the population in Riyadh (Central Department of Statistics and Information, 2012). This percentage is high and arose from citizens immigrating from neighboring cities and villages to Riyadh for the purpose of finding better jobs or gaining education. Another source of the high demand of housing in Riyadh is the low average of age in Riyadh, which is a mere 18 years (Alhawas, 2010). All of these young citizens will continue to be in need of houses for the next 10 years. The recommendations to solve this problem are threefold. 1) Revive small cities around Riyadh to reduce the number of people moving in to big cities, which will create "reverse immigration" where people emigrate from large cities to small ones. Yanbu (in the western region) and Jubail (in the eastern region) are good examples of two cities that the Saudi government developed to discourage people from moving to the capitol city. 2) The current height limit in housing areas is only two floors, so allowing citizens to build more floors on their houses will help reduce the high demand in Riyadh. 3) Improve the current mortgage system so that more citizens can begin to move into houses.

5.4 Additional Thoughts from the Survey/Experts

The participants mentioned other factors less frequently, which nevertheless affect housing's costs.

1) Construction's companies struggle with lousy management. Many construction's projects run into problems a mere couple of months after commencement due to bad management and lack follow up, which will delay projects and make them cost even more than the initial estimated budget. The high demand of housing has also encouraged some contractors to take more projects beyond their capacity, leading to inadequate management.
2) The government has not been proactive in bolstering underdeveloped cities. Only a few satellite cities, such as Jubail and Yanbu, have attracted substantial residents, so the Saudi government has to develop other cities in other regions around Riyadh to decrease the population's growth in Riyadh.
3) Many Saudi families suffer from the law that restricts them from building more than two floors in their houses. This law has increased the demand of housing in Riyadh, because a house with only two floors is not conducive to subletting. Thus, the government should allow more floors in houses to face the high demand.
4) Many laborers who work in construction's projects lack credibility. The high demand has created a labor shortage that many workers can exploit. If the government monitors the laborers and applies sanctions for manipulation, it can decrease costs of construction.

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 Summary

The city of Riyadh suffers from high housing and construction's costs, which have increased by more than 200% in the last 7 years. Saudis initially thought that this problem was temporary, but the citizens of Riyadh continue to suffer from the escalation of housing costs to this day. There is a significant interest in identifying the key causes of the problem, and there are numerous opinions on where this problem stems from. It seems as if every expert or specialist has a unique opinion about the factors that led to costs' escalation in the past few years.

Some researchers look at this problem from a social perspective, because in the Saudi culture every citizen believes he/she should own a house, and most Saudis currently cannot afford to own a house. The government is interested in understanding the causes of housing and construction costs' escalation in order to develop strategies to address this crucial issue and find long-term solutions to offer affordable housing.

In response to the absence of research regarding this problem, the researcher has decided to conduct a survey to try to identify the factors that led to the significant escalation in construction's costs in Saudi Arabia in the past few years, focusing on the city of Riyadh as a case study. While conducting a literature review, the researcher identified 16 factors that were mentioned as possible factors. It is unknown which of these factors are more influential than others, and as such, the main objective of this study is to conduct a survey to identify the most significant factors that affect the housing sector.

All of the survey samples were collected from construction industry professionals and experts who work in Riyadh, including experts, specialists, engineers, economists, construction material's suppliers, and individuals in related fields. The required sample size was calculated using the statistical equation mentioned in Chapter 4, and based on an estimated level of confidence of 90%, standard error of 10%, and a standard deviation calculated from 30 random samples collected initially. The required sample size was estimated to be at least 215 surveys, and the researcher was able to collect a total of 237 surveys from experts in the field of construction.

After collecting the data, the researcher analyzed the data through Microsoft Excel software by applying descriptive statistics, including determining the means, modes, and standard deviations. Tables and figures have been used to show the results of the survey. After analyzing the data, the researcher identified the main factors based on the mode and mean averages. The researcher has identified the top four factors that caused the increase of housing and construction's costs.

These four factors are as follows: corruption in selling lands, speculative purchases of lands, high demand of housing, and the high rate of population's growth in Riyadh. All of these factors and more have contributed to the significant increase in the costs of housing and construction in Riyadh in the past few years.

6.2 Conclusion

The four main factors that increased the housing costs are studied more in-depth, and recommendations were made on how to address them:

1) **Factor.15,** which is corruption in assigning/selling undeveloped lands. The mean score for the impact of this factor, as identified by experts, is 4.49, with a mode of 5. The recommendations for addressing/resolving problems caused by this factor consist of four folds: (1) apply an annual 15% tax on very large plots of lands to prevent monopoly, it is estimated that it will help bring down housing costs by at least 30% (Alhugail, 2012), (2) monitor the prices of land, unify plot sizes, and establish tough sanctions on monopoly, (3) prevent land grants in developed areas, and (4) prevent investors from owning large expanses of land in developed/undeveloped areas. Solving the problem of corruption requires serious actions from the government as investors are already monopolizing enormous proportions of usable lands. The above few recommendations should help address this problem for a short term.
2) **Factor.14,** which is speculative purchase of undeveloped lands. The mean score of the impact of this factor, as identified by experts, is 4.35, with a mode of 5. The recommendations for addressing/resolving the problems caused by this factor consist of three folds: (1) prevent speculative purchases in housing areas, and establish laws and conditions for buying and selling all types of land, (2) create large land areas with infrastructure, and unify these areas into one large area, such as 350 m^2, so that large areas of land are purchased only once and for the sole purpose of building houses, and (3) unify the prices of land tracts within each

area. The government must prevent the speculative purchases of developed/ undeveloped lands to actually start solving this problem. The above recommendations should solve this problem on a short term.

3) **Factor.4,** which is high demand of housing. The mean score of the impact of this factor, as identified by experts, is 4.32, with a mode of 5. The recommendations for addressing/resolving problems caused by this factor consist of four folds: (1) the government should monitor the prices of construction's materials and unify the prices for each item. In addition, establish tough sanctions on manipulation, and prevent companies from storing large amount of construction's materials, thirst the market of those materials to sell them at higher prices. Moreover, prevent companies from exporting construction's materials outside Saudi Arabia without government permission, (2) ask international construction's companies with extensive experience to share their experiences on how to reduce costs and to obtain development strategies and good management for housing projects, (3) unify the prices of rental apartments, and (4) reduce public work projects to decrease the prices of construction's materials. The Saudi government has to monitor the market of housing and construction to prevent manipulation. Monitoring will stop manipulation and that will help decrease constriction's costs in Riyadh.
4) **Factor.6** which is rapid rise in the rate of population's growth. The mean score of the impact of this factor, as identified by experts, is 4.29, with a mode of 5. The recommendations for addressing/ resolving the problems caused by this factor consist of three folds: (1) revive small cities around Riyadh to reduce congestion

and crowding, which will reduce the immigration to large cities, such as Riyadh. Yanbu (in the western region) and Jubail (in the eastern region) are good examples of two cities that the Saudi government developed to discourage people from moving to the capitol city, (2) the current height limit in housing areas is only two floors, so allowing citizens to build more floors in their houses will help reduce the high demand of construction's materials in Riyadh, and (3) develop a new mortgage system to assist with the high demand so that more citizens can begin to move into houses instead of apartments . When the government retrieves and develops small cites around Riyadh that will encourage people to stay in their cities and reduce the high demand of housing in Riyadh. The government should allow Saudi citizens to build more than two floors to make the housing as a vertically movement to reduce the high demand.

6.3 Recommendations for future work

- Future research work will focus on improving the results by studying the correlation among the top four crucial factors, if any, and how they are related to one another.
- Further research will also focus on developing strategic solutions for identified problems on a long term in Riyadh.
- Also future research could focus on evaluating the effect of taking the aforementioned recommended corrective actions to see whether they are effective enough to slow down the escalation of housing and construction's costs.
-

APPENDIX - A = TEST SURVEY

Factors العوامل	Effect on Escalating Building & Construction Costs التأثير على زيادة أسعار البناء والتشييد				
	Very High عالي جدا	High عالي	Moderate متوسط	Low منخفض	Very Low منخفض جدا
1. Oil price escalation. (influx in national income that drives inflation) 1- إرتفاع أسعار النفط. (زياده في الدخل القومي مما يزيد التضخم)					
2. Increasing demand for construction materials. (due to recent government subsidization of housing projects) 2- الطلب المتزايد على مواد البناء. (بسبب الدعم الحكومي لمشاريع الإسكان حديثاً)					
3. Increasing demand for engineering services to support development of public works projects. (government projects, such as schools, hospitals, and infrastructure) 3- الطلب المتزايد للخدمات الهندسية لدعم مشاريع الأشغال العامه. (المشاريع الحكوميه مثل المدارس والمستشفيات والبنية التحتية)					
4. High demand for housing. 4- إرتفاع الطلب على المساكن.					
5. Poor construction productivity. (leading to low supply of housing) 5- ضعف انتاجيه التشييد والبناء (مما يؤدي الى إن إنخفاض المعروض من المساكن)					
6. Rapid rise in the rate of population growth. 6- الارتفاع السريع في معدل النمو السكاني.					
7. Monopoly and unethical practices of suppliers. (cement, steel and other construction materials) 7- التلاعب والإحتكار من قبل الموردين (الأسمنت والحديد ومواد البناء الأخرى)					
8. Lack of trained labor. 8- نقص العمالة المدربة.					
9. Government's poor role in monitoring materials prices. 9- ضعف الرقابه على أسعار مواد البناء.					
10. Poor inspection and monitoring of government projects. (leading to increased project duration) 10- ضعف رقابه ومتابعه المشاريع العامه. (مما يؤدي إلى التأخر في إنهاء المشروع)					
11. Existence of a black market. (materials and labor) 11- وجود السوق السوداء للمقاولات (مواد و عمالة)					
12. High inflation rate. 12- إرتفاع معدل التضخم.					
13. Contractors undertaking projects beyond their capacity. 13- تصدي المقاولون لمشاريع تتجاوز قدراتهم.					
14. Speculative purchase of undeveloped lands. 14- المضاربة في شراء الأراضي الغير المطورة.					
15. Corruption in assigning/selling undeveloped lands. 15- الفساد في تخصيص وبيع الاراضي الغير مطورة.					
16. Exporting construction materials. 16- تصدير مواد النباء الى الخارج.					
17. Others: 17- عوامل أخرى:					

APPENDIX-B

Factors	Samples																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
F15. Lands corruption	4	5	5	5	5	5	5	5	4	5	5	4	5	5	5	5	5	5	5	5	5	5	4	5	5
F14. Lands speculative	4	5	5	5	2	3	3	5	4	5	4	4	5	5	5	5	5	5	4	5	5	5	3	5	5
F4. Housing demand	4	4	4	5	4	5	5	5	4	5	3	4	5	4	5	5	4	4	5	4	4	4	5	5	3
F6. Population growth	4	5	2	5	4	5	4	5	4	5	4	3	4	3	4	5	5	3	4	4	5	5	4	5	2
F5. Poor productivity	3	4	2	5	3	3	5	5	4	4	3	4	4	2	2	4	3	3	4	5	4	4	5	4	4
F9. Monitoring materials prices	3	4	3	5	4	4	3	5	4	4	5	2	3	4	4	4	4	5	3	5	4	4	4	5	3
F16. Exporting materials	3	3	3	4	5	3	3	1	2	3	5	2	3	1	2	3	3	4	4	5	3	3	5	4	2
F11.Black market	4	5	2	4	3	4	4	3	2	3	5	3	1	4	3	5	4	4	4	5	5	4	3	3	5
F7. Suppliers monopoly	4	5	3	5	4	3	4	5	3	4	5	2	3	4	5	4	5	5	4	5	5	4	5	4	3
F2. Materials demand	3	4	4	5	3	3	4	1	5	4	4	5	3	4	4	4	4	5	5	3	3	2	4	4	4
F13. Contractors with less capacity	4	5	4	5	5	3	3	5	3	4	4	3	3	4	3	5	5	3	5	5	5	5	3	4	5
F10. Monitoring of gov. prjoects	4	5	3	5	5	3	3	5	2	4	5	2	2	2	2	5	4	2	4	5	5	3	3	4	4
F1. Oil price	3	4	4	4	4	3	3	5	3	4	2	4	1	3	3	4	4	4	3	3	5	3	3	3	4
F8. Lack of labor	4	4	4	5	5	4	3	5	4	4	4	3	3	2	3	4	5	3	3	5	4	3	4	4	3
F3. Engneering demand	3	4	5	5	5	3	3	1	4	4	4	4	3	3	3	5	3	2	4	3	3	2	4	3	5
F12. Inflation rate	2	4	3	5	4	4	3	3	3	3	4	3	4	3	3	4	4	3	4	4	3	4	4	3	3

Factors	Samples																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
F15. Lands corruption	5	5	4	4	5	5	4	4	5	4	4	4	5	5	5	4	5	5	5	5	5	4	2	5	5
F14. Lands speculative	5	5	5	4	5	5	3	4	5	5	5	4	5	5	5	4	4	4	5	4	5	5	4	5	5
F4. Housing demand	4	5	4	4	2	4	4	3	5	4	4	3	5	5	2	4	5	4	4	3	5	4	5	3	5
F6. Population growth	5	5	5	5	4	5	4	3	4	5	4	4	3	5	5	4	5	4	3	3	4	5	4	2	5
F5. Poor productivity	4	4	3	2	2	4	4	2	5	4	5	4	4	4	5	4	3	5	5	3	4	4	1	2	4
F9. Monitoring materials prices	3	4	3	5	5	5	4	3	2	4	4	3	4	4	3	4	5	4	5	5	5	4	2	4	5
F16. Exporting materials	2	3	4	4	4	4	4	2	2	5	4	4	3	2	1	3	4	4	4	5	3	4	2	5	4
F11.Black market	1	2	4	5	5	5	5	2	2	4	4	4	3	3	3	4	5	4	5	4	5	4	2	3	3
F7. Suppliers monopoly	2	4	5	4	5	5	5	2	1	4	4	4	3	3	3	4	5	4	3	4	5	5	1	3	5
F2. Materials demand	4	4	3	5	4	3	4	2	3	4	5	4	4	3	3	4	5	4	2	3	4	4	2	4	4
F13. Contractors with less capacity	2	4	3	4	4	5	4	2	3	4	5	4	4	3	5	4	5	4	4	5	4	3	2	3	4
F10. Monitoring of gov. prjoects	1	3	4	5	3	5	4	2	1	4	4	4	5	3	4	4	4	5	4	5	5	3	2	3	4
F1. Oil price	4	3	3	5	3	3	3	2	2	3	5	3	4	2	4	3	5	4	1	2	1	3	2	4	3
F8. Lack of labor	2	5	4	5	5	5	4	2	1	5	4	4	4	3	3	4	5	5	5	1	3	5	2	3	4
F3. Engneering demand	3	1	3	5	3	3	3	3	1	4	5	4	4	2	4	4	5	5	2	1	3	3	2	3	3
F12. Inflation rate	3	4	4	5	5	5	5	3	3	4	5	4	5	3	2	4	4	4	3	4	3	4	3	5	5

Factors	Samples																								
	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
F15. Lands corruption	5	5	5	5	5	5	5	5	5	5	4	3	2	5	5	4	5	3	5	3	5	3	4	3	5
F14. Lands speculative	4	5	4	4	5	5	5	5	5	4	4	3	2	4	5	4	3	4	4	4	4	3	3	3	4
F4. Housing demand	4	4	3	5	5	5	4	4	5	5	5	4	4	4	5	5	4	5	5	4	3	4	3	4	5
F6. Population growth	4	5	4	4	2	3	5	4	5	5	5	4	4	4	5	5	4	5	5	4	4	2	4	3	5
F5. Poor productivity	3	4	3	4	1	3	4	2	4	5	4	4	5	4	5	3	4	4	4	5	3	3	4	3	5
F9. Monitoring materials prices	4	4	5	4	3	5	2	4	5	5	5	4	5	2	5	3	4	5	5	4	5	4	3	5	5
F16. Exporting materials	4	3	4	3	1	1	3	5	2	5	5	5	3	3	5	3	4	3	3	3	4	4	5	4	3
F11.Black market	4	4	4	4	5	5	2	4	4	3	5	4	4	5	3	3	4	4	5	3	3	1	5	5	4
F7. Suppliers monopoly	4	4	5	4	4	5	3	4	5	3	5	4	5	3	3	3	4	3	3	3	4	3	4	2	5
F2. Materials demand	5	4	2	5	5	5	4	4	4	3	5	3	4	2	4	3	3	5	3	5	3	4	3	4	5
F13. Contractors with less capacity	4	5	4	3	4	5	3	3	5	5	5	4	2	4	3	2	2	4	5	3	5	3	4	4	2
F10. Monitoring of gov. prjoects	4	5	5	3	3	5	2	3	5	5	5	4	4	5	4	2	4	3	5	4	5	1	4	4	5
F1. Oil price	2	5	3	3	3	1	4	4	2	1	5	2	4	2	5	3	3	5	3	4	3	4	3	4	5
F8. Lack of labor	5	4	2	4	2	4	3	4	3	5	5	4	5	5	3	4	4	3	5	4	4	4	5	5	5
F3. Engneering demand	4	4	3	5	2	3	3	4	1	2	4	4	4	2	4	2	2	4	4	5	3	3	3	4	5
F12. Inflation rate	4	5	4	3	4	5	3	3	3	3	5	3	2	3	2	3	1	3	1	3	4	1	5	3	1

Factors	Samples																								
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
F15. Lands corruption	4	5	4	5	5	3	5	4	5	5	4	5	5	5	4	5	5	5	5	4	5	5	4	5	4
F14. Lands speculative	4	1	4	5	4	3	5	4	5	5	4	5	4	3	4	5	5	4	4	5	5	5	3	5	2
F4. Housing demand	4	1	4	5	3	4	4	4	4	5	5	4	5	5	4	4	4	5	4	5	5	4	3	5	3
F6. Population growth	4	1	5	5	4	5	5	4	4	5	4	2	5	4	4	4	4	5	4	5	5	4	3	4	3
F5. Poor productivity	5	1	4	5	4	5	5	5	5	5	5	3	3	4	1	2	3	2	4	4	3	3	3	5	3
F9. Monitoring materials prices	4	1	3	5	3	4	4	3	3	5	5	4	4	5	2	5	4	4	1	4	5	3	4	5	4
F16. Exporting materials	4	1	4	5	3	3	5	2	5	5	5	5	5	4	4	4	4	3	4	5	5	4	4	3	4
F11.Black market	2	1	2	5	4	2	5	5	5	4	5	5	3	3	5	4	3	3	2	5	5	5	3	5	4
F7. Suppliers monopoly	4	1	5	4	4	5	5	3	3	5	4	1	3	4	1	2	5	2	5	3	4	3	2	3	4
F2. Materials demand	5	1	5	2	4	5	3	3	2	5	5	4	4	5	5	2	4	3	2	4	4	3	2	4	4
F13. Contractors with less capacity	5	1	4	1	3	2	5	2	1	1	5	3	4	1	4	2	3	3	3	5	5	1	5	1	4
F10. Monitoring of gov. prjoects	3	1	3	5	3	2	3	4	5	5	4	3	3	4	4	5	3	3	2	4	2	3	3	3	3
F1. Oil price	5	1	5	2	4	5	3	4	2	5	5	5	5	3	5	2	4	3	1	5	4	3	2	4	5
F8. Lack of labor	3	1	4	2	2	4	4	4	4	3	5	5	3	4	4	3	3	3	1	4	3	4	4	3	4
F3. Engneering demand	5	1	5	2	4	3	4	3	4	3	5	5	4	5	1	2	4	2	4	3	2	3	2	4	4
F12. Inflation rate	2	1	3	1	2	2	2	5	1	1	4	2	4	2	5	4	3	3	2	5	1	1	4	1	3

Factors	Samples																								
	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
F15. Lands corruption	5	4	5	4	4	3	5	4	2	5	3	5	4	5	5	4	3	4	4	4	5	5	5	4	4
F14. Lands speculative	5	3	5	4	4	4	5	4	3	5	4	5	4	5	5	4	3	3	5	4	5	5	5	4	2
F4. Housing demand	5	4	4	4	4	4	4	4	4	5	4	5	4	3	4	3	5	4	5	4	5	4	4	4	4
F6. Population growth	5	4	2	4	5	5	5	4	4	5	4	3	4	4	4	4	5	5	5	3	5	5	5	4	4
F5. Poor productivity	5	5	2	3	4	4	3	4	4	5	2	5	3	3	3	4	3	3	3	4	5	3	4	2	4
F9. Monitoring materials prices	5	5	4	3	5	4	5	3	3	5	2	5	5	5	4	4	5	5	5	2	1	2	5	2	4
F16. Exporting materials	4	4	5	1	5	2	4	4	4	2	1	3	5	5	4	2	5	2	3	4	5	4	5	3	4
F11.Black market	5	4	3	4	5	4	5	4	2	5	5	5	5	4	3	3	4	3	3	3	5	3	5	2	4
F7. Suppliers monopoly	5	4	5	2	2	5	5	3	5	5	5	5	3	4	3	4	3	5	3	3	4	3	4	3	5
F2. Materials demand	1	4	4	4	3	2	2	5	5	2	5	3	3	4	3	3	3	5	3	5	2	4	3	3	5
F13. Contractors with less capacity	3	3	5	4	4	3	3	3	4	3	4	1	2	5	3	2	2	4	3	3	5	4	5	3	2
F10. Monitoring of gov. prjoects	3	5	5	4	4	5	3	4	3	5	4	5	4	5	3	4	3	4	3	2	2	4	5	2	4
F1. Oil price	1	5	4	4	3	2	1	4	5	1	5	3	3	4	4	3	5	4	4	5	2	4	3	2	5
F8. Lack of labor	2	4	3	4	4	4	4	2	3	1	5	2	4	3	2	4	3	5	2	3	2	3	2	2	5
F3. Engneering demand	1	4	3	4	3	4	3	5	4	2	2	5	3	4	3	3	3	5	2	5	4	3	4	2	5
F12. Inflation rate	2	2	4	2	5	2	1	3	4	1	5	3	3	4	3	2	5	5	3	3	1	2	5	3	2

Factors	Samples																								
	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
F15. Lands corruption	4	5	3	3	5	5	4	5	5	4	4	4	4	4	4	4	3	5	5	4	4	5	5	5	4
F14. Lands speculative	4	4	4	3	4	4	4	5	5	5	4	4	4	3	4	4	3	5	5	4	4	5	5	5	4
F4. Housing demand	4	4	4	4	5	5	4	4	4	5	4	2	4	3	4	4	4	4	5	4	5	5	5	5	5
F6. Population growth	4	5	4	3	3	5	4	5	4	5	4	2	2	4	3	4	4	4	5	4	4	5	3	5	5
F5. Poor productivity	3	4	4	3	4	5	5	5	4	5	4	2	5	2	3	3	5	2	2	3	2	3	4	4	3
F9. Monitoring materials prices	4	4	3	4	4	3	3	3	1	5	3	4	2	3	5	4	4	4	5	4	4	4	5	5	4
F16. Exporting materials	4	4	4	3	3	3	4	4	5	5	5	5	4	5	2	5	5	4	4	3	2	4	4	4	4
F11.Black market	3	5	4	3	5	4	4	4	5	1	1	4	5	4	2	3	2	3	3	3	2	3	5	5	4
F7. Suppliers monopoly	4	4	2	3	3	4	5	4	3	5	4	4	2	4	5	3	2	2	2	3	4	3	2	5	2
F2. Materials demand	3	5	5	4	4	1	5	4	4	5	5	3	5	3	5	3	3	2	3	2	3	1	3	2	4
F13. Contractors with less capacity	1	5	3	3	4	4	4	4	5	1	4	4	4	2	5	3	4	4	3	3	2	4	3	5	4
F10. Monitoring of gov. prjoects	4	4	4	3	3	3	3	4	2	5	1	2	1	4	4	3	4	3	3	4	3	3	3	3	4
F1. Oil price	5	5	5	4	5	1	5	1	4	5	5	3	5	3	5	4	3	2	3	2	5	1	3	1	4
F8. Lack of labor	2	5	5	3	5	3	3	3	3	3	3	2	4	4	4	3	1	3	4	3	2	3	2	2	2
F3. Engneering demand	3	5	5	4	4	2	2	4	3	3	5	3	5	3	4	3	3	2	3	2	2	2	2	3	4
F12. Inflation rate	4	4	4	2	4	4	4	4	3	1	2	2	5	4	2	3	5	4	4	3	2	4	1	2	4

Factors	Samples																								
	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
F15. Lands corruption	5	4	5	4	3	4	5	5	5	5	5	5	4	5	4	5	5	4	5	5	5	4	5	5	4
F14. Lands speculative	5	3	5	5	3	4	4	5	4	4	5	4	5	5	5	4	5	4	5	5	5	4	5	5	5
F4. Housing demand	5	4	5	5	5	3	5	5	5	5	5	5	5	3	5	5	4	4	5	4	5	4	5	3	1
F6. Population growth	5	4	5	5	5	4	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	4	4	2
F5. Poor productivity	5	1	4	2	2	4	5	5	3	3	5	3	3	3	4	5	3	2	4	3	4	5	5	3	5
F9. Monitoring materials prices	4	5	5	3	2	4	2	3	1	3	3	4	1	3	3	3	1	3	2	3	5	4	5	3	5
F16. Exporting materials	5	5	2	3	4	4	3	5	5	4	5	4	4	3	3	4	4	2	4	5	4	5	5	5	5
F11.Black market	3	3	2	3	2	4	3	3	2	4	4	4	3	3	2	5	2	4	4	2	4	3	4	4	5
F7. Suppliers monopoly	5	2	2	4	2	3	3	4	3	4	3	3	1	5	4	4	4	3	3	5	3	4	4	4	5
F2. Materials demand	4	1	3	3	3	3	3	3	3	5	4	5	4	4	3	4	4	3	2	3	4	5	4	4	5
F13. Contractors with less capacity	5	3	1	2	4	4	2	3	2	5	3	5	4	3	2	5	2	5	5	3	5	4	5	5	3
F10. Monitoring of gov. prjoects	3	5	2	2	3	3	2	3	3	5	2	2	4	3	1	4	1	4	2	2	4	4	5	5	5
F1. Oil price	4	1	1	3	2	3	3	1	2	4	5	3	4	4	4	4	5	3	2	4	5	3	5	4	1
F8. Lack of labor	5	5	2	2	2	4	3	2	5	5	5	4	1	3	3	4	5	4	3	4	5	3	4	4	5
F3. Engneering demand	4	1	2	3	2	3	2	2	1	4	3	4	4	3	4	4	4	3	2	2	5	5	5	4	5
F12. Inflation rate	3	3	1	4	3	4	3	5	3	2	3	4	3	3	2	4	2	4	4	3	3	3	4	4	1

Factors	Samples																								
	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
F15. Lands corruption	5	4	5	4	5	4	4	4	4	4	5	4	5	5	5	5	5	5	4	5	5	5	4	5	5
F14. Lands speculative	5	5	5	5	5	5	5	5	5	4	4	4	5	5	4	5	5	5	4	5	5	5	4	5	5
F4. Housing demand	5	4	4	5	5	4	5	5	5	5	5	5	5	5	5	3	5	5	5	5	2	5	5	5	2
F6. Population growth	2	4	4	5	4	5	5	5	5	5	5	5	5	4	5	4	5	5	5	5	5	5	5	4	5
F5. Poor productivity	5	5	4	4	4	3	5	4	4	3	4	4	3	3	5	3	3	4	2	3	5	5	5	5	2
F9. Monitoring materials prices	2	2	4	1	5	3	4	1	4	2	1	1	4	4	5	4	2	5	4	4	3	4	3	4	3
F16. Exporting materials	4	2	4	4	5	5	4	2	5	4	5	3	3	5	4	4	3	4	5	4	5	4	3	5	2
F11.Black market	4	2	4	4	5	4	5	3	2	3	4	2	5	4	5	3	2	4	3	3	4	4	3	3	4
F7. Suppliers monopoly	2	4	3	1	3	4	4	1	4	3	2	3	3	3	4	3	2	4	4	4	5	5	4	4	4
F2. Materials demand	4	3	3	1	4	4	5	2	5	3	4	4	4	4	4	4	3	3	2	4	2	4	2	5	4
F13. Contractors with less capacity	5	5	5	1	5	4	1	1	3	1	2	3	3	4	4	3	2	2	2	3	5	5	5	4	3
F10. Monitoring of gov. prjoects	3	2	4	5	5	5	3	2	5	2	5	1	4	3	3	3	4	2	2	4	3	4	2	3	5
F1. Oil price	4	3	3	1	5	3	5	2	5	4	4	5	5	4	4	5	5	5	3	4	3	4	3	5	5
F8. Lack of labor	2	3	4	1	5	5	1	1	5	2	1	3	3	3	5	4	2	3	3	2	4	5	1	4	2
F3. Engneering demand	5	5	3	1	4	5	5	1	5	2	5	3	3	3	4	4	4	2	3	3	3	4	3	5	3
F12. Inflation rate	4	1	4	1	4	5	1	1	4	2	4	3	1	4	2	3	4	3	3	3	4	4	3	3	1

Factors	Samples																								
	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
F15. Lands corruption	5	4	5	5	4	4	4	4	5	5	5	5	4	5	1	3	5	4	5	5	5	5	5	4	4
F14. Lands speculative	2	5	5	5	4	3	5	5	5	5	5	5	3	4	2	5	4	5	5	4	5	5	5	5	4
F4. Housing demand	3	5	5	4	5	5	5	5	2	4	3	5	5	5	4	5	3	5	5	5	5	4	5	5	5
F6. Population growth	5	3	5	3	5	5	5	5	5	3	3	5	5	4	4	4	5	4	5	4	2	4	5	5	5
F5. Poor productivity	4	5	3	4	5	4	5	5	5	4	2	5	5	5	4	4	5	5	3	3	5	5	4	4	5
F9. Monitoring materials prices	2	5	3	4	1	2	4	3	4	4	2	3	4	5	3	2	4	5	2	5	5	4	5	5	4
F16. Exporting materials	5	2	2	4	3	5	3	2	5	4	3	2	5	3	5	4	5	3	4	3	5	4	2	3	3
F11.Black market	3	5	2	4	1	5	5	3	2	5	4	3	3	5	3	5	4	2	4	4	5	3	3	4	4
F7. Suppliers monopoly	4	5	4	3	2	3	3	4	3	4	2	2	3	5	3	5	5	5	3	5	3	4	3	3	3
F2. Materials demand	3	5	3	5	2	5	3	3	1	4	3	2	3	2	3	5	4	4	3	5	3	5	3	2	2
F13. Contractors with less capacity	3	1	2	5	2	4	3	4	2	4	3	2	2	5	4	1	5	4	3	2	4	2	2	4	3
F10. Monitoring of gov. prjoects	3	2	4	5	1	3	5	3	2	3	2	3	4	4	3	3	5	3	3	5	4	5	2	2	4
F1. Oil price	5	2	3	5	1	5	3	2	2	5	3	1	4	1	1	2	5	4	1	4	4	4	3	5	4
F8. Lack of labor	3	2	3	3	1	5	4	5	3	5	2	3	4	2	4	5	2	4	2	4	4	2	2	4	4
F3. Engneering demand	2	1	2	5	2	3	3	2	1	3	2	3	1	4	4	5	3	4	4	4	4	4	1	3	2
F12. Inflation rate	5	1	1	5	2	4	3	2	2	3	1	2	1	2	2	4	5	4	3	5	4	5	3	2	3

Factors	Samples											
	226	227	228	229	230	231	232	233	234	235	236	237
F15. Lands corruption	5	4	4	5	4	4	5	5	5	5	5	5
F14. Lands speculative	5	4	4	5	4	4	4	4	5	4	3	5
F4. Housing demand	5	5	5	5	5	5	5	5	5	4	5	5
F6. Population growth	5	5	4	5	5	5	3	5	5	5	5	5
F5. Poor productivity	3	3	2	2	5	3	2	3	5	5	3	3
F9. Monitoring materials prices	4	5	2	2	4	3	4	4	4	4	5	4
F16. Exporting materials	4	3	5	2	4	5	1	4	3	4	3	2
F11.Black market	3	4	3	2	4	3	2	3	4	3	5	5
F7. Suppliers monopoly	3	4	3	2	3	3	3	2	3	4	3	4
F2. Materials demand	3	4	3	2	4	3	4	3	3	5	4	3
F13. Contractors with less capacity	3	3	5	2	4	3	3	4	5	4	2	3
F10. Monitoring of gov. prjoects	3	3	2	2	5	3	3	3	4	3	3	1
F1. Oil price	3	4	3	2	4	3	5	3	3	4	5	2
F8. Lack of labor	3	2	3	2	4	5	3	3	3	5	2	1
F3. Engneering demand	2	2	2	2	4	2	4	4	4	4	5	3
F12. Inflation rate	3	3	4	2	4	3	2	3	4	3	3	1

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